DOT MATRIX PRINTER

LC-7211

TECHNICAL MANUAL

[THIRD EDITION]

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INTRODUCTION

This manual is an introduction to the LC-7211.
It is designed for use as a reference for periodic inspections and maintenance procedures to be executed by service personnel. It is not intended for the general user. Users of this manual should have a basic knowledge and understanding of the English language.

- This manual is divided into the following sections:

Chapter 1 General Specifications
Chapter 2 Theory of Operation
Chapter 3 Adjustments
Chapter 4 Parts Replacement
Chapter 5 Maintenance and Lubrication
Chapter 6 Troubleshooting
Chapter 7 Parts List

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CHAPTER 1
GENERAL SPECIFICATIONS

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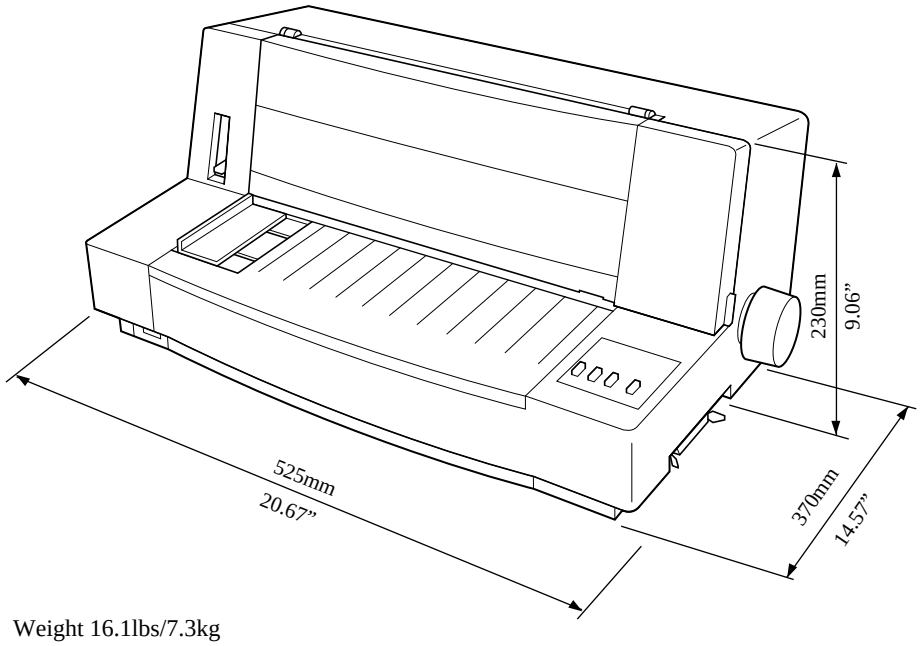
1. General Specifications

Printing System	Serial Impact Dot-Matrix		
Printing Speed	Pitch	Draft(cps/dpi)	NLQ(cps/dpi)
	Pice (10cpi)	225/120H	56/240H
	Elite (12cpi)	270/120H	67/240H
	Condensed pica (17cpi)	191/240H	95/240H
	Condensed elite (20cpi)	225/240H	112/240H
	H:half-dot		
Print Direction	Draft:	Bi-directional logic seeking	
	NLQ:	Uni-directional/bi-directional logic seeking (selectable)	
	Bit-Image:	Uni-directional/bi-directional logic seeking (selectable)	
Print Head	Number of pins:	9	
	Life:	200 million dots/pin (adjustment lever position 1 to 3)	
		100 million dots/pin (adjustment lever position 4 to 8)	
Line Spacing	1/6", 1/8"		
	7/72", n/72", n/216": software		
Character Matrix	Pitch	Draft	NLQ
	Pica (10cpi)	9×11	18×23
	Elite (12cpi)	9×9	18×19
	Condensed Pica (17cpi)	9×11	18×12
	Coodensed elite (20cpi)	9×9	18×10
Environment	Operating temperature:	41°F to 95°F (5°C to 35°C)	
	Storage temperature:	–22°F to 149°F (–30°C to 65°C)	
	Operating humidity:	30% to 80% (noncondensing)	
	Storage humidity:	20% to 90% (noncondensing)	
Paper	Cut-sheet		
	Paper width:	5.5" to 12" / 140 to 305mm	
	Paper length:	5.5" to 11"/ 140 to 280mm	
	Paper weight (1-ply):	14 to 42 lbs / 52 to 156 g/m^2 / 45 to 135 kg	
	Multi-part:	11 to 14 lbs / 40 to 52 g/m^2 / 34 to 45 kg; pressure sensitive paper	
		Total thickness: 0.020" / 0.5mm	
	Copies:	Original + 6	
	Fanfold		
	Paper width:	4.5" to 12" / 114 to 305mm	
	Paper weight (1-ply):	14 to 22 lbs / 52 to 81 g/m^2 / 45 to 70 kg	
	Multi-part:	11 to 14 lbs / 40 to 52 g/m^2 / 34 to 45 kg; pressure sensitive paper	
		Total thickness: 0.02" / 0.5mm	
	Copies:	Original + 6	

	Labels	
	Backing sheet:	4.5" to 12" / 114 to 305mm
	Thickness:	
	Backing sheet	0.0028" to 0.0035" / 0.07 to 0.09mm
	Total thickness	0.0075" / 0.19mm max.
	Envelope	
	#10	9.4 × 4.1 / 240 × 104mm
Emulation	Standard Mode: EPSON ESC/P (9-pin)	
	IBM Mode: Proprinter III	
Interface	Standard:	Centronics parallel
	Option:	RS-232C serial
Ribbon Type	On-carriage, dedicated	
	Fabric monochrome ribbon (Black only)	
	Z9HD:	Standard type
	LZ9:	Long life type (option)
Ribbon Life	Z9HD:	2 million characters (ASCII draft)
	LZ9:	4 million characters (ASCII draft)
Power Supply	120V AC +10%/–17%, 230V AC +14%/–13%; 50/60Hz (depending on country of purchase)	
Power Consumption	10W during stand-by	
	31W during ASCII draft printing	
Options	SPC-8K Serial-To-Parallel Converter	



Weight 16.1lbs/7.3kg

Fig. 1-1 External dimensions

2. External Appearance and Composition

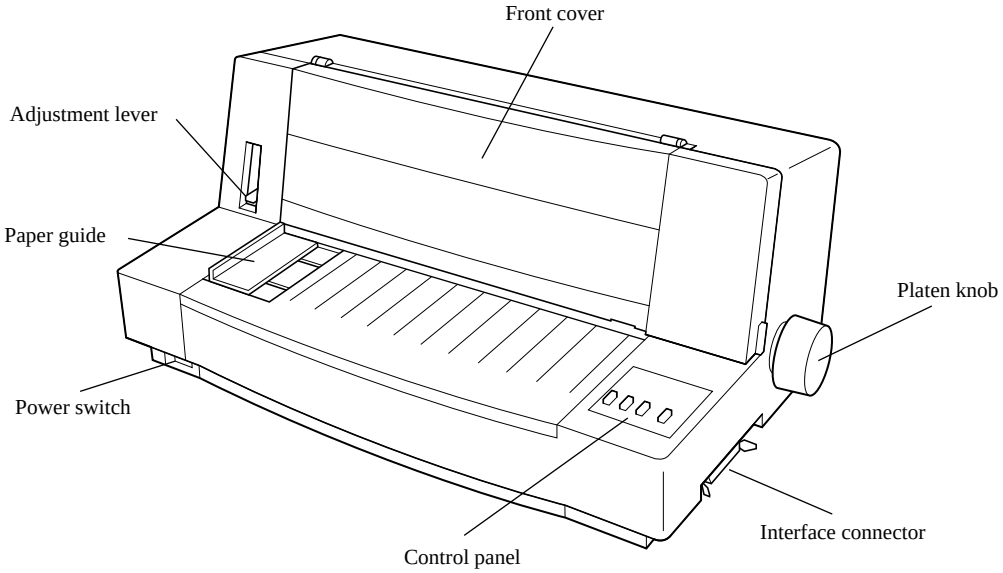


Fig. 1-2 Front view of the Printer

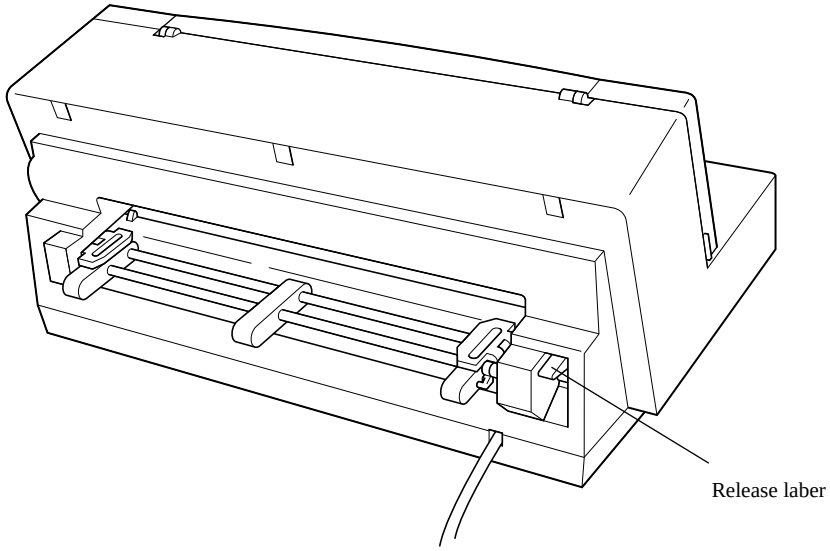


Fig. 1-3 Rear view of the Printer

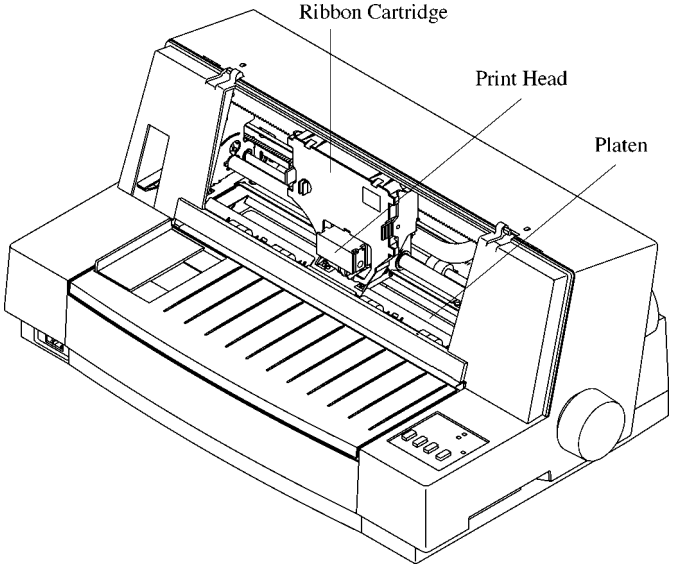


Fig. 1-4 Front cover removed

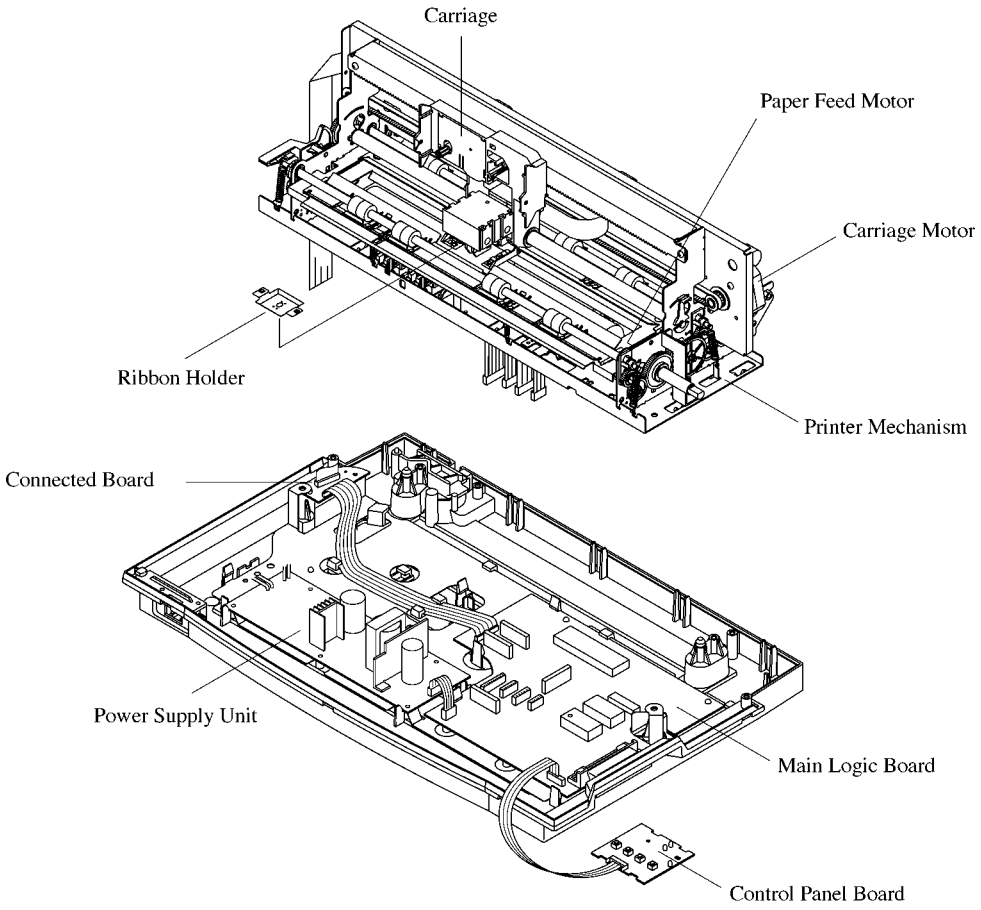
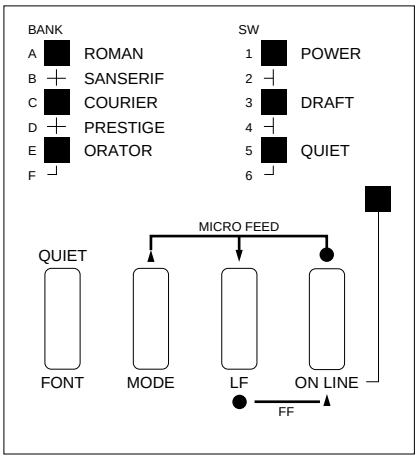


Fig. 1-5 Diagram of internal layout

3. Control Panel

3-1. Switch Combination Functions



Short test 2

Hex-Dump Long test Short test 1

Dot-adjust mode

EDS mode

EDS mode

Aging mode

POWER-ON

Quiet Tear off Set/Eject/Park Off-Line

ON-LINE

Font Mode LF/Set On-Line

Panel macro Form feed

Backward Forward Micro feed

Set TOF

Buffer clear and All reset

Auto loading position change mode

OFF-LINE

Bank Switch On/Off Exit

Print

EDS MODE

Left Right Next Exit

DOT ADJUSTMENT MODE

Paper Loading Backward Foward Cancel

Set

Save

Factory settings

AUTO LOADING POSITION CHANGE MODE

3-2. EDS Mode Settings

Bank	Switch	Function	ON	OFF
A	1	Emulation	Standard / EPSON	IBM
	2	Character Table (CT) Standard / EPSON mode	Graphics	Italics
		IBM mode	IBM #2	IBM #1
	3	RAM Usage	Input Buffer	Download Buffer
	4	(Not used)		
	5	Paper Out Detector	Enabled	Disabled
	6	(Not used)		
B	1	Graphics Direction	Bi-directional	Uni-directional
	2	Auto Tear-off (Long)	Disabled	Enabled
	3	Line Spacing	1/6"	1/8"
	4	Auto LF with CR	Disabled	Enabled
	5	Zero Style	Normal	Slashed
	6	Strobe Timing	Normal	Reverse
C	1, 2	Print Mode		
		Draft: 4 ON	NLQ: 4 ON	4 OFF
		(Not used): 4 OFF	(Not used): 4 OFF	4 OFF
	3,4,5	Print Pitch		
		10cpi: ON ON ON	20cpi: OFF OFF ON	
		12cpi: OFF ON ON	Proportional: ON ON OFF	
		17cpi: ON OFF ON		
	6	Quiet	Disabled	Enabled
D	1,2,3,4	Page Length		
		11"/Letter: ON ON ON ON	14"/Legal: OFF ON OFF ON	
		8": OFF ON ON ON	10.5"/Executive: ON OFF OFF ON	
		11.7"/A4: ON OFF ON ON	7.25"/Executive: OFF OFF OFF ON	
		12": OFF OFF ON ON	3.5": ON ON ON OFF	
		8.5"/Letter: ON ON OFF ON	5.5": OFF OFF ON OFF	
E	1,2,3,4,5	Code Page (CT=Graphics, IBM #1, #2)		
		#437: ON ON ON ON ON	#1001: ON ON ON ON OFF	
		#850: OFF ON ON ON ON	#737: OFF ON ON ON OFF	
		#860: ON OFF ON ON ON	#851: ON OFF ON ON OFF	
		#861: OFF OFF ON ON ON	#869: OFF OFF ON ON OFF	
		#863: ON ON OFF ON ON	#928: ON ON OFF ON OFF	
		#865: OFF ON OFF ON ON	#2001: OFF ON OFF ON OFF	
		#866: ON OFF OFF ON ON	#772: ON OFF OFF ON OFF	
		#3840: OFF OFF OFF ON ON	#774: OFF OFF OFF ON OFF	
		#3841: ON ON ON OFF ON	#3001: ON ON ON OFF OFF	
		#3843: OFF ON ON OFF ON	#3002: OFF ON ON OFF OFF	
		#3844: ON OFF ON OFF ON	#3011: ON OFF ON OFF OFF	
		#3845: OFF OFF ON OFF ON	#3012: OFF OFF ON OFF OFF	
		#3846: ON ON OFF OFF ON	#3021: ON ON OFF OFF OFF	
		#3847: OFF ON OFF OFF ON	#3031: OFF ON OFF OFF OFF	
		#3848: ON OFF OFF OFF ON	#3041: ON OFF OFF OFF OFF	
		#852: OFF OFF OFF OFF ON		
		International Character Set (CT=Italics)		
		U.S.A.: ON ON ON ON ON	Japan: ON ON ON OFF ON	
		France: OFF ON ON ON ON	Norway: OFF ON ON OFF ON	
		Germany: ON OFF ON ON ON	Denmark-2: ON OFF ON OFF ON	
		England: OFF OFF ON ON ON	Spain-2: OFF OFF ON OFF ON	
		Denmark-1: ON ON OFF ON ON	Latin America: ON ON OFF OFF ON	
		Sweden: OFF ON OFF ON ON	Korea: OFF ON OFF OFF ON	
		Italy: ON OFF OFF ON ON	Ireland: ON OFF OFF OFF ON	
		Spain-1: OFF OFF OFF ON ON	Legal: OFF OFF OFF OFF ON	
F	1, 2, 3, 4, 5	LQ Font Selection		
		Roman: ON ON ON ON ON	Prestige: OFF OFF ON ON ON	
		Sanserif: OFF ON ON ON ON	Orator: OFF OFF OFF ON ON	
		Courier: ON OFF ON ON ON		

4. Parallel Interface

4-1. General Specifications

Item	Specifications
Interface	Centronics-compatible
Synchronization System	Via externally supplied $\overline{\text{STROBE}}$ pulse
I/F Protocol	Using $\overline{\text{ACK}}$ and BUSY signals
Logic Level	Compatible with TTL level

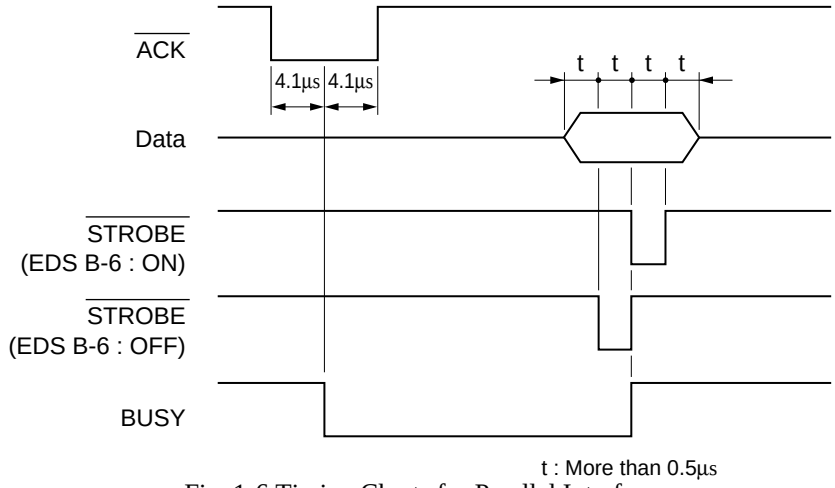


Fig. 1-6 Timing Charts for Parallel Interface

4-2. Connector Signals

Pin	Name	Function
1	$\overline{\text{STROBE}}$	Goes low for ≥ 0.5µs when active.
2	DATA0	These signals represent information for the 1st through 8th bit of parallel data, respectively. Each signal is HIGH when data is logical 1, and LOW when logical 0.
3	DATA1	
4	DATA2	
5	DATA3	
6	DATA4	
7	DATA5	
8	DATA6	
9	DATA7	
10	$\overline{\text{ACK}}$	10µs low to acknowledge receipt of data.
11	BUSY	Printer sets line low when ready to receive data.
12	PAPER	High when paper runs out.
13	SELECT	High when printer is on-line.
14	$\overline{\text{AFXT}}$	Printer ignores this signal.
15	Not used.	
16	SIGNAL GND	Signal ground
17	CHASSIS	Chassis ground (isolated from signal ground)
18	+5V	+5V DC output from printer
19~30	GND	Twisted pair ground return
31	$\overline{\text{RESET}}$	Printer is reset when this signal goes low.
32	$\overline{\text{ERROR}}$	Low when printing cannot continue due to error.
33	EXT GND	External ground
34~35	Not used	
36	$\overline{\text{SELECT IN}}$	Printer ignores this signal.

5 Serial Interface (optional)

When using the serial interface, the optional Serial-Parallel Converter must be connected to the printer.

5-1. General Specifications

Item	Specifications
Interface	RS-232C level
Synchronization System	Asynchronous
Baud rate	150 - 19,200 bits per second (BPS) [selectable] 150, 300, 600, 1200, 2400, 4800, 9600, 19200 BPS
Word length Start bit: Data bit: Parity bit: Stop bit:	 1 bit 7 or 8 bits (selectable) Odd, Even or None (selectable) More then 1bit length
Signal polarity Mark: Space:	 Logic “1” (–3V to –15V) Logic “0” (+3V to +15V)
Handshaking	DTR XON/XOFF ETX/ACK
Data buffer	8KB (standard)

5-2. Connector Signal and Functional Descriptions

Pin No.	Signal name	Direction	Function
1	GND	—	Printer chassis ground.
2	TXD	OUT	This pin carries data from the printer.
3	RXD	IN	This pin carries data to the printer.
4	RTS	OUT	Always space.
5	CTS	—	This signal is space when the computer is ready to send data. The printer does not check this pin.
6	NC		Unused.
7	GND	—	Signal ground.
8~10	NC		Unused.
11	RCH	OUT	The printer sets this signal to space when it is ready to receive data. This line carries the same signal as pin 20.
12~19	NC		Unused.
20	DTR	OUT	The printer sets this signal to space when it is ready to receive data.
21~25	NC		Unused.

5-3. DIP Switch Settings

Switch	ON	OFF
1	8 data bits	7 data bits
2	No parity	Parity checked
3	Handshaking protocols – see table below	
4		
5	Odd parity	Even parity
6	Data transfer rate – see table below	
7		
8		

All switches are set to ON before the printer leaves the factory.

Protocol	Switch 3	Switch 4
DTR mode	ON	ON
XON/XOFF mode	ON	OFF
ETX/ACK mode	OFF	ON

Baud rate	Switch 6	Switch 7	Switch 8
150	OFF	OFF	OFF
300	OFF	OFF	ON
600	OFF	ON	OFF
1200	OFF	ON	ON
2400	ON	OFF	OFF
4800	ON	OFF	ON
9600	ON	ON	OFF
19200	ON	ON	ON

6. EE-PROM mode

6-1. Outline

These settings can be changed in the EE-PROM mode by writing data directly to the EE-PROM on the main logic board:

Setting EE-PROM mode

- Send <ESC><SUB>(09)H command.

Canceling EE-PROM mode

- Initialize the printer by sending <ESC>@

6-2. Explanation of special control codes

<ESC>@ Exits printer from EE-PROM mode and initializes the printer.

<ESC>M@ Returns all data in the EE-PROM to the factory settings. After the buffer is cleared, the buzzer sounds. If the printer is powered off before the buzzer sounds, all data in the buffer is not cleared.
If all data is not cleared from the buffer, operation is not guaranteed. Be sure to allow the buzzer to sound before you turn the printer off!

<ESC>MWn

Code	Function	Address	Capacity
<ESC>MW0 <data>	Stores data into entire area of EE-PROM.	00H-7FH	128bytes
<ESC>MW1nm	Stores data (m) into the address (n)	nH	1 byte
<ESC>MW2<data>	Stores auto-start software data into EE-PROM.	2CH-54H 55H-7DH	41bytes 41bytes

- The data (m) used in the commands above are stored in the specified address in order (n).
- When the data to be stored exceeds the specified capacity, subsequent data are ignored.
- Data are stored in the EE-PROM according to the memory map. (See section 3. EDS mode setting and 6-3. EE-PROM Map.)
- After all data are stored, a beep indicates the completion of storage.
- If the printer is powered off during data storage, data stored before power off are valid, but subsequent operation of the printer is not guaranteed.

Do not power off the printer while data is being stored!

<ESC>MR Dumps all data in the EE-PROM to a hard copy.

For an example of using these control codes, see section 6-4. For the corresponding EE-PROM addresses, see the EE-PROM memory map in section 3-2. EDS mode setting and 6-3 EE-PROM Map.

6-3. EE-PROM MP

<table>
<tr><th>Address</th><th>Function</th><th>Factory data</th></tr>
<tr><td>00H</td><td>EDS setting
<table>
<tr><th>Bit</th><th>Function</th><th>1</th><th>0</th></tr>
<tr><td>b0</td><td>Emulation</td><td>STANDARD/EPSON</td><td>IBM</td></tr>
<tr><td rowspan="2">b1</td><td>Character Table
Standard / EPSON mode</td><td>
Graphics</td><td>
Italics</td></tr>
<tr><td>IBM mode</td><td>IBM #2</td><td>IBM #1</td></tr>
<tr><td>b2</td><td>RAM Usage</td><td>Input Buffer</td><td>Download Buffer</td></tr>
<tr><td>b3</td><td>(Not used)</td><td>—</td><td>—</td></tr>
<tr><td>b4</td><td>Paper out Detector</td><td>Enabled</td><td>Disabled</td></tr>
<tr><td>b5</td><td>(Not used)</td><td>—</td><td>—</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>01H</td><td>EDS setting
<table>
<tr><th>Bit</th><th>Function</th><th>1</th><th>0</th></tr>
<tr><td>b0</td><td>Graphics Direction</td><td>Bi-directional</td><td>Uni-directional</td></tr>
<tr><td>b1</td><td>Tear-off</td><td>Disabled</td><td>Enabled</td></tr>
<tr><td>b2</td><td>Line Spacing</td><td>1/6"</td><td>1/8"</td></tr>
<tr><td>b3</td><td>Auto LF with CR</td><td>Disabled</td><td>Enabled</td></tr>
<tr><td>b4</td><td>Zero Style</td><td>Normal</td><td>Slashed</td></tr>
<tr><td>b5</td><td>Strobe Timing</td><td>Normal</td><td>Reverse</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>02H</td><td>EDS setting
Print Mode
<table>
<tr><th>Function</th><th>b0</th><th>b1</th></tr>
<tr><td>Draft</td><td>1</td><td>1</td></tr>
<tr><td>NLQ</td><td>1</td><td>0</td></tr>
</table>
Print Pitch
<table>
<tr><th>Function</th><th>b2</th><th>b3</th><th>b4</th></tr>
<tr><td>10cpi</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>12cpi</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>17cpi</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>20cpi</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Proportional</td><td>1</td><td>1</td><td>0</td></tr>
</table>
<table>
<tr><th>Bit</th><th>Function</th><th>1</th><th>0</th></tr>
<tr><td>b5</td><td>Quiet</td><td>Disabled</td><td>Enabled</td></tr>
</table></td><td>FFH</td></tr>
<tr><td>03H</td><td>EDS setting
Page Length
<table>
<tr><th>Function</th><th>b0</th><th>b1</th><th>b2</th><th>b3</th></tr>
<tr><td>11"/Letter</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>8"</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>11.7"/A4</td><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>12"</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>8.5"/Letter</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
</table>
<table>
<tr><th>Function</th><th>b0</th><th>b1</th><th>b2</th><th>b3</th></tr>
<tr><td>14"/Legal</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>10.5"/Executive</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>7.25"/Executive</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>3.5"</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>5.5"</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
</table></td><td>FFH</td></tr>
</table>

<table>
<tr><th>Address</th><th>Function</th><th>Factory data</th></tr>
<tr><td>04H</td><td>EDS setting
IBM Code Page (Character Table=Graphics, IBM#1, #2)
<table>
<tr><th>Function</th><th>b0</th><th>b1</th><th>b2</th><th>b3</th><th>b4</th></tr>
<tr><td>#437</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>#850</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
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<tr><td>#864</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>#866</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>#3840</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
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<tr><td>#3843</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>#3844</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>#3845</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>#3846</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
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<tr><td>#3848</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>#852</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
</table>
International Character Set (Character Table=Italics)
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<tr><td>18H</td><td>Misalignment correction Multi-part Mode</td><td>240 DPI (H) Text</td><td>80H</td></tr>
<tr><td>19H</td><td>Misalignment correction Multi-part Mode</td><td>240 DPI (H) Bit-image</td><td>80H</td></tr>
</table>

Address	Function	Factory data
1AH, 1BH	Top Margin in Auto-loading Tractor	48H 00H
1CH, 1DH	Top Margin in Auto-loading Friction	48H 00H
1EH~21H	Macro Set EPSON	00H | 00H
22H~25H	Macro Set IBM	00H | 00H
26H, 27H	TEAR OFF (Short)	00H 80H
28H, 29H	TEAR OFF (Long)	00H 80H
2AH, 2BH	Initial Condition Area	FFH FFH
2CH~54H	Auto Start Area EPSON (41 byte)	00H | 00H
55H~70H	Auto Start Area IBM (41 byte)	00H | 00H
7EH	FF Control Code (Space 00H / Null 0FH)	00H
7FH	EE-PROM Check Code	01H

6-4. Rewriting the EE-PROM

Follow this procedure to rewrite the EE-PROM.

(1) Turn the printer on.

(2) Load a BASIC disk in the computer.

(3) Turn the computer on.

(4) Set a sheet of paper in the printer, and press the ON LINE switch.

(5) Enter the program listed below and run the program.

```
10 LPRINT CHR$(27);CHR$(26);CHR$(&H09)
20 LPRINT CHR$(27);"MW1";CHR$(&H01);CHR$(&HFB)
30 LPRINT CHR$(27);"MR"
```

BASIC Program Code	What It Does
10 LPRINT CHR$(27);CHR$(26);CHR$(&H09)	Enters the EE-PROM mode.
20 LPRINT CHR$(27);"MW1";	Starts rewriting the EE-PROM.
CHR$(&H01);	Address data from &H01 will show EDS mode from the EE-PROM memory map.
CHR$(&HFB)	Data from &HFB will change the Line spacing from 1/6" to 1/8".
30 LPRINT CHR$(27);"MR"	Dumps all EE-PROM data to hexadecimal.

(6) To complete the setting, turn the printer off.

CHAPTER 2
THEORY OF OPERATION

2

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   4-4. Paper Feed Mechanism 25

   4-5. Detectors 26

1. Block Diagram (Main logic Board)

The block diagram of this printer is shown in Fig. 2-1.

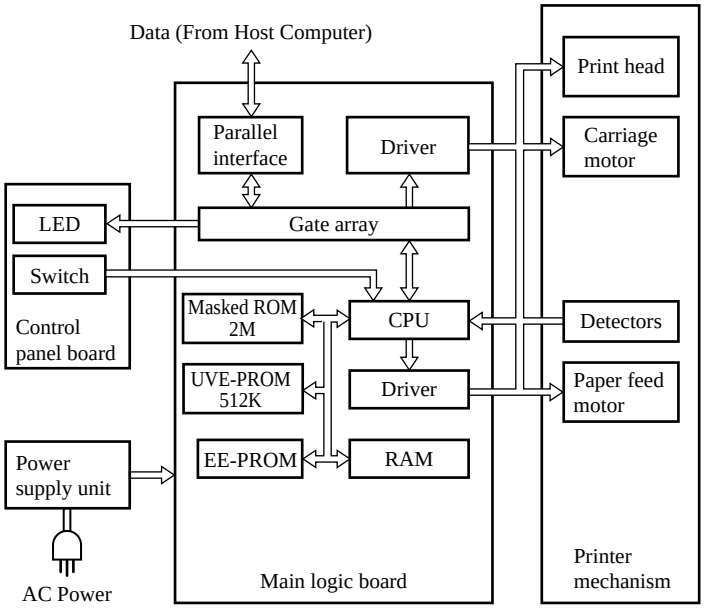

Fig. 2-1 Block Diagram

(1) Main Logic Board

This board receives data from the host computer and stores it in the RAM in the order it arrives. The CPU on this board reads the data from the RAM, and edits it according to the program stored in the ROM.

When editing is completed, various drive signals from the CPU are sent to the printer mechanism to perform printing.

Explanation

- CPU TMP90C041

Controls this printer.

- UVE-PROM 27512 512K bit

Contains the program which executes control of the printer. UVE-PROM is not provided with some versions of the software.

- Masked ROM 2M bit

Contains the character font and the program.

- EE-PROM KM93C46 64 × 16 bits

Contains the data (EDS data and so on) in the memory switch.

- RAM 256K bytes

Used as a stack area, work area and data buffer of the CPU.

- Parallel interface
- Gate array (custom IC)

Inputs/outputs several signals.

- Driver

The data edited by the CPU and gate array are sent to the printer mechanism after conversion to the signal for the print head drive and motor drives.

(2) Control panel board

Panel circuit for manual control of the printer.

(3) Printer Mechanism

Consists of a print head, carriage motor, paper feed motor, and detectors.

(4) Power Supply Unit

Converts AC power to 33VDC and 5VDC.

2. Main Logic Board

2-1. General Flow Chart

The flow chart below shows you the general flow of editing and printing operations.

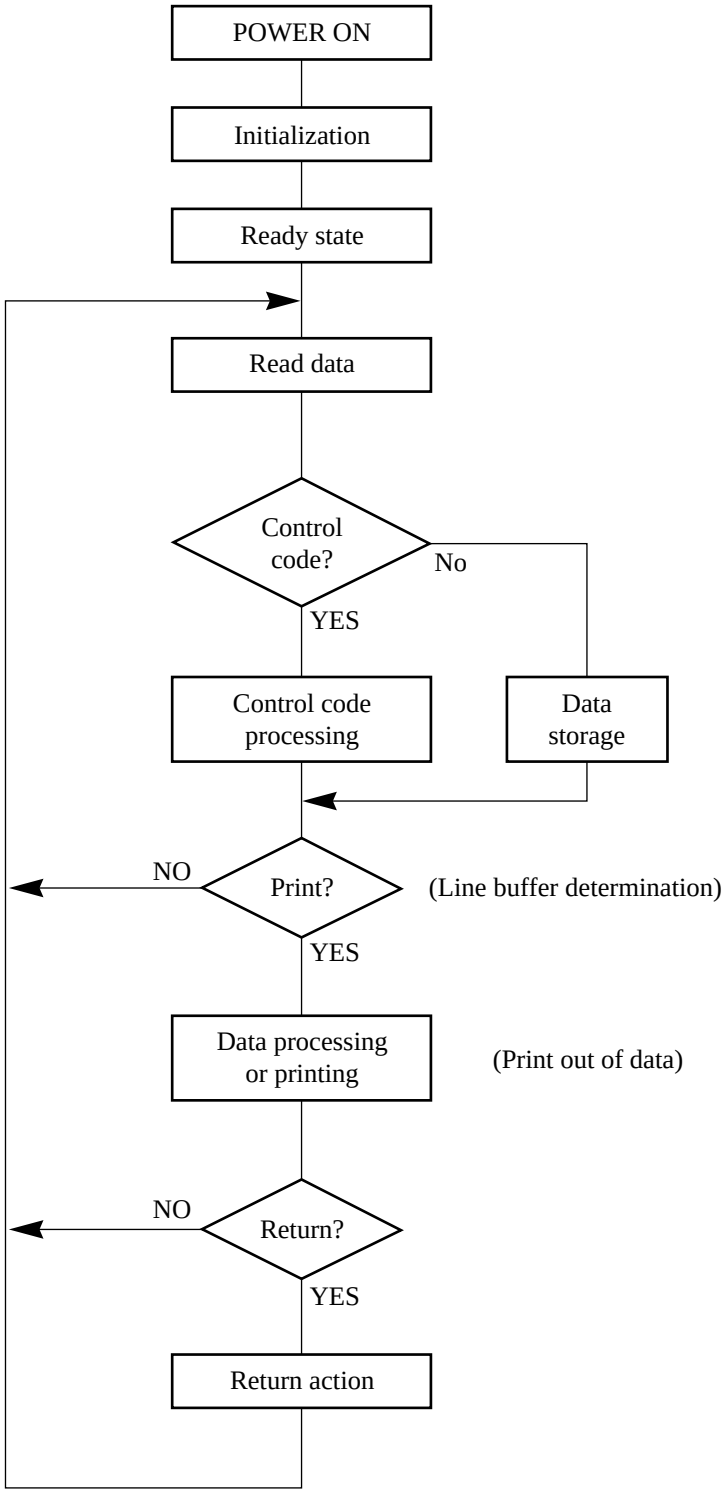

Fig. 2-2 General Flow Chart of Editing and Printing

3. Power Supply Circuit

A ringing choke converter type circuit is used with a dropper type circuit in the power supply unit, fulfilling the input and output conditions described in the chart below.

	Voltage Range	Max. Current Output	Service	Circuit Type
Input	110VAC, 120VAC	1.0 A		
	220VAC to 240VAC	0.6 A		
Output	5 VDC ±5%	0.4 A	For logic circuit drive, for motor holding.	Dropper
	33 VDC ±5%	1.25A	For print head drive, for motor drive.	Ringing choke converter.

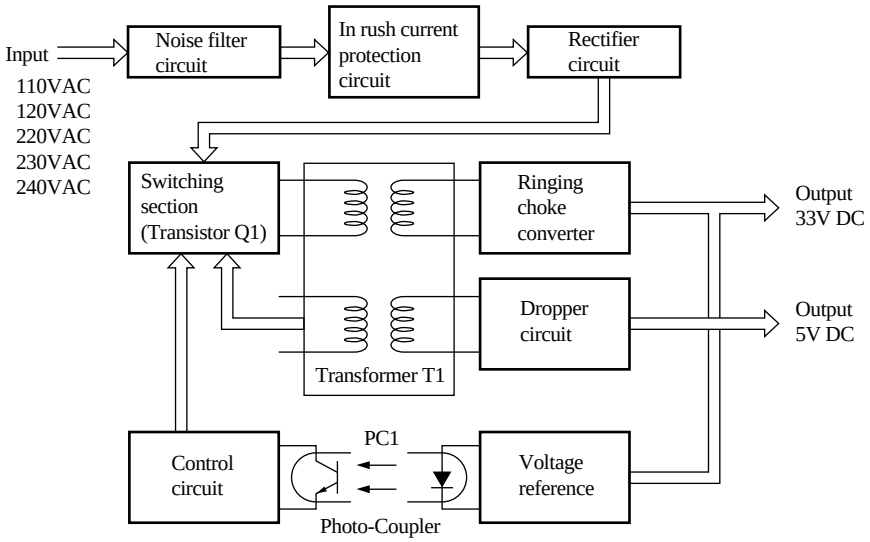

Fig. 2-3 Power Supply unit block diagram

4. Mechanism

4-1. Print Head Mechanism

The print head consists of 9 needle wires and 9 print solenoids.

The following explains how each needle wire operates during printing.

(1) When the print solenoid is energized, the clapper is attracted by the iron core and the needle wire is driven toward the platen.

(2) This needle wire hits the platen via the ink ribbon and paper. A single dot is printed on the paper.

(3) When the print solenoid is de-energized, the needle wire is returned to its original position by rebound energy and spring and clapper holder (leaf spring) force.

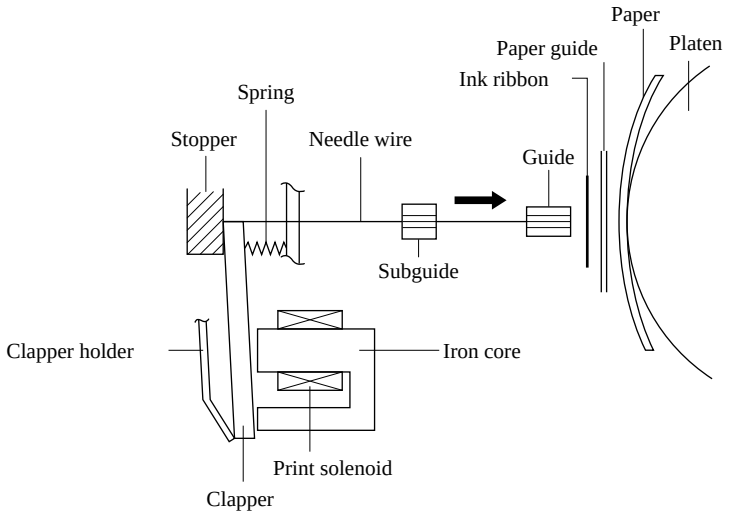

Fig. 2-4 Outline of Print Head Mechanism

4-2. Print Head Carrying Mechanism

The print head carrying mechanism consists of a carriage, timing belt, carriage motor, and home position detector.

Carriage

The carriage is supported horizontally by the carriage stay and rear angle. The carriage moves from side to side with the print head mounted above it. A timing belt is clamped to the base of the carriage and a shield plate is mounted at the base for home position detection.

Timing Belt

The timing belt is suspended between the timing pulley of the carriage motor and the timing pulley of the tension lever. The timing belt maintains a constant tension.

The timing belt is also clamped to the base of the carriage so that it can move the carriage accurately with driving force from the carriage motor.

Carriage Motor

The carriage motor is a HB (Hybrid)type, 4-phase, 192-pole pulse motor driven by pulse signals from the control circuit. The rotational rate depends on the number of pulses per unit time. By varying this rotational rate (carriage carrying rate), the size of the horizontal letters can be changed in each print mode.

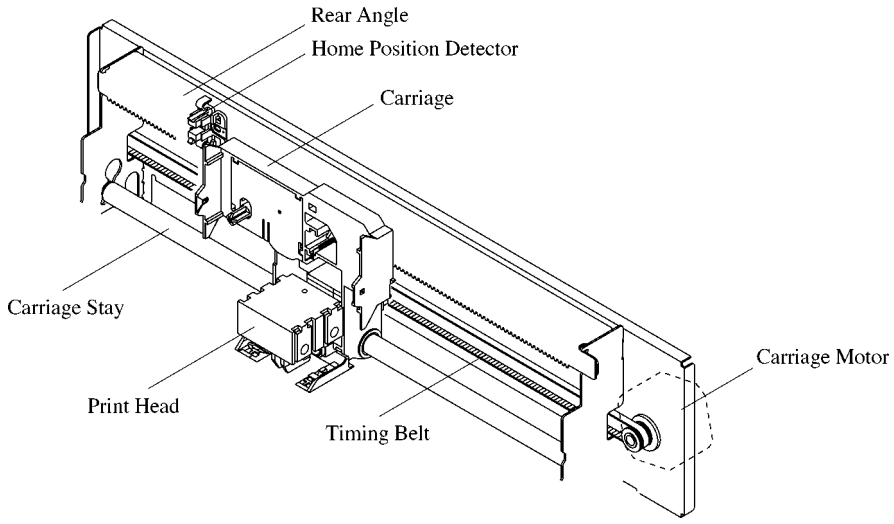

Fig. 2-5 Print Head Carrying Mechanism

4-3. Ink ribbon feed mechanism

The ink ribbon feed mechanism is linked to the print head carrying mechanism so the ink ribbon always winds automatically in the same direction while the carriage moves left and right.

The movement of the carriage along the serrated edge of the rear angle of the printer mechanism drives the idler gear. The rotation of the idler gear is conveyed sequentially to the gears that work and wind the ribbon. The carriage has a clutch lever that keeps the direction of the cassette gear rotation constant, regardless of the direction of the idler gear rotation as the carriage moves left and right.

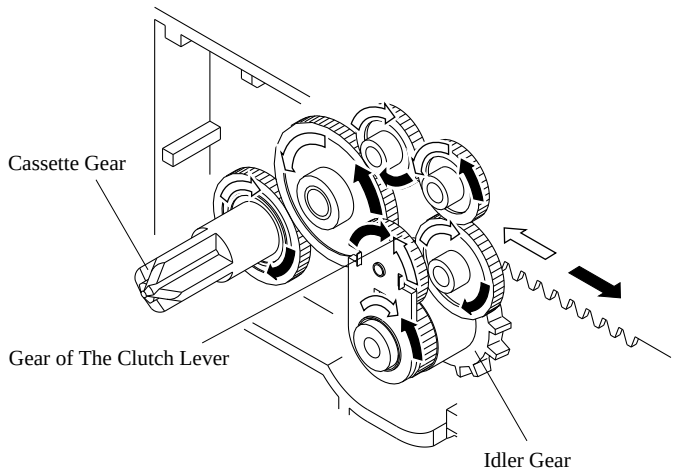

Fig. 2-6 Ribbon feed mechanism

4-4. Paper Feed Mechanism

The paper feed mechanism consists of a paper feed motor, an idler gear, a platen and a traction unit.
The paper feed motor is a PM (Permanent Magnet) 4-phase and 48 pulse motor.
There are two ways of feeding paper into the printer: the friction method and the tractor method. You can select the method you want to use by setting the release lever on the optional push tractor unit.

Position of release lever	[1]	[2]
Engaement of the PF idler gear	Not linked	Linked
Status of the PF roller and PF roller	Pressed	Not
Release lever position detector	Open	Closed
Paper feeding method	Friction	Tractor

- Friction Method
  Friction method is selected when the release lever is position [1].
  With this method, paper is pressed between the platen roller and the holder roller therefore, paper is fed as the rollers turn.
  As the paper feed motor is driven, the motor gear, through the idler gear, turns the platen gear in the paper feeding direction. However, since the tractor gear and the tractor clutch are not linked at this time, the tractor unit will not be driven.
- Tractor Method
  Tractor method is selected when the release lever is position [2].
  Paper feeding is facilitated by rotation of the sprocket pin of the tractor unit. When the tractor method is selected, the PF idler gear is linked to the PF idler gear, enabling the drive force generated by the paper feed motor to be transferred to the tractor unit via the idler gear.

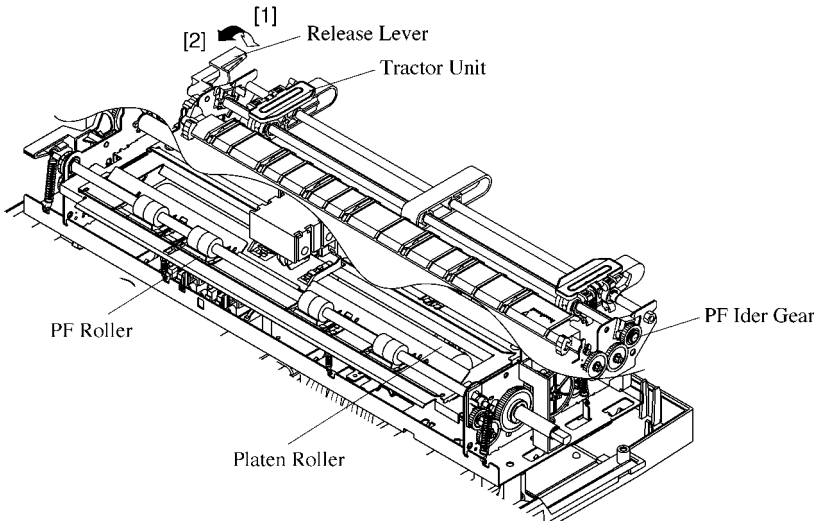

Fig. 2-7 Paper Feed Mechanism

4-5. Detectors

(1) Print head temperature detectors

The A/D converter in the CPU detects the print head temperature at power on and before each line begins to print.

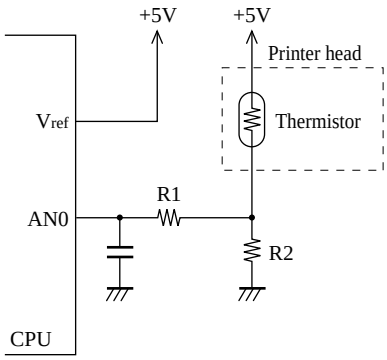

Fig. 2-8 Printer head temperature detector circuit

Control Method

Print	A/D Conversion Value POINT	AN Voltage V	Temperature °C
Error stop (thermistor open)	0-5	0.00	-
Normal print	6-213	0.00-4.35	~120
Unidirectional print	214-221	4.35-4.48	120-130
Print stop	222-251	4.48-4.83	Over 130
Error stop (thermistor closed)	252-255	Over 5.00	-

(2) Home Position Detector

A photo-interrupter is used in the home detector on the printer.

ON/OFF signals are generated according to the position of the carriage. (Shield plate mounted at the base of the carriage.) The printing position is determined by these signals.

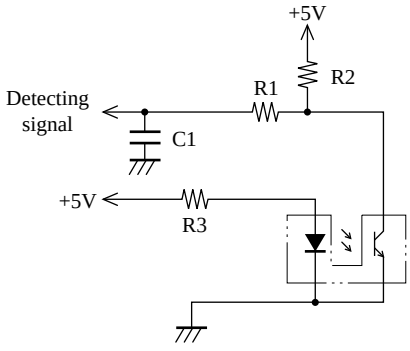

Fig. 2-9 Carriage home position detector circuit

Control Method

Output (V)	Decision
5	in home position (with shield plate)
0	not in home position (without shield plate)

(3) Paper end Detector

The paper end Detector is located in the paper chute unit. The A/D converter in the CPU detects the presence or absence of paper.

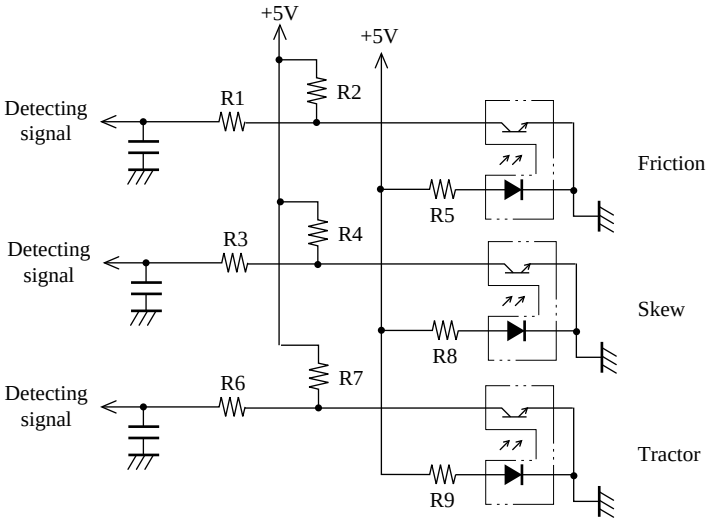

Fig. 2-10Paper end detector circuit

Control Method

Output (V)	Detection
0	No paper
5	Paper present

(4) Release lever switch and lever switch Adjustment

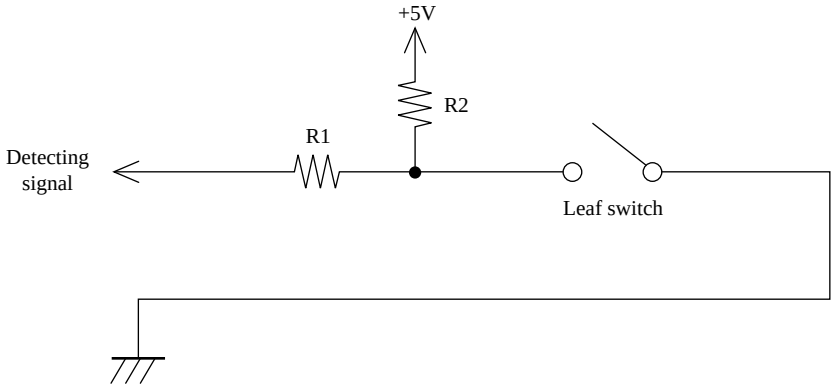

Fig. 2-11 Release lever switch circuit and Adjustment lever switch circuit

Control Method

Output (V)	Release Lever SW	Adjustment Lever SW
0	Tractor	Normal mode
5	Friction	Multi-part mode

CHAPTER 3
ADJUSTMENTS

This printer has undergone various adjustments so that it will attain a given standard of performance.
In this chapter, a brief explanation is given of the methods for making adjustments.
Follow the instructions when performing maintenance inspections or when replacing parts to correct malfunctions.

1. Adjustment of Gap Between Print Head and Platen 31

2. Adjustment of Timing Belt Tension 32

1. Adjustment of Gap Between Print Head and Platen

(1) Remove the front case unit ,rear angle and ribbon holder [1] according to the procedures described in chapter 4. (Fig. 3-1)
(2) Install rear angle [2].
(3) Set adjusting lever [3] to the second position from the bottom. (Fig. 3-1)
(4) Position the center of the carriage unit [4] 55 mm from the left end of the platen assy [5]. (Fig. 3-2)
(5) Measure the gap between platen [5] and head [6] using a gauge [7] . (Fig. 3-3)
(6) Use adjusting bushing L [8] to adjust the gap to between 0.34 and 0.40 mm. (Fig. 3-4)
(7) Position the center of the carriage unit [4] 55 mm from the right end of the platen assy [5], then measure the gap and adjust it in the same way.
(8) Repeat steps (4) to (6) to measuring the gap and readjusting as necessary.
(9) Remove the rear angle [2].
(10) Install the ribbon holder [1], rear angle [2] and front case.

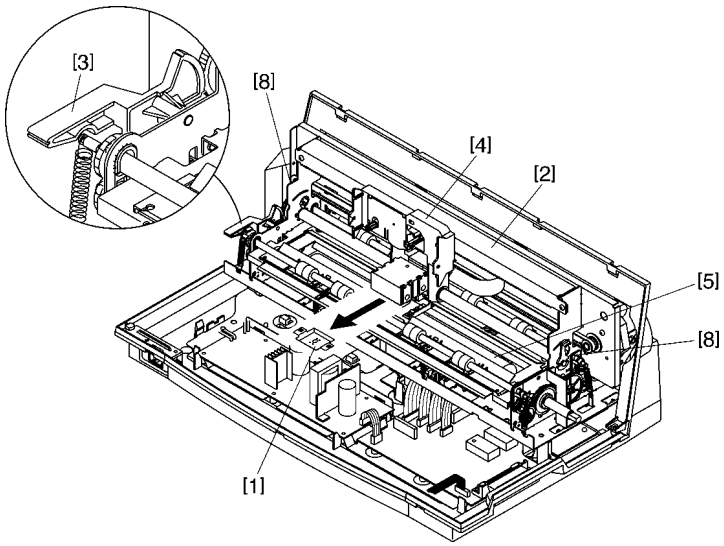

Fig. 3-1 Mechanism

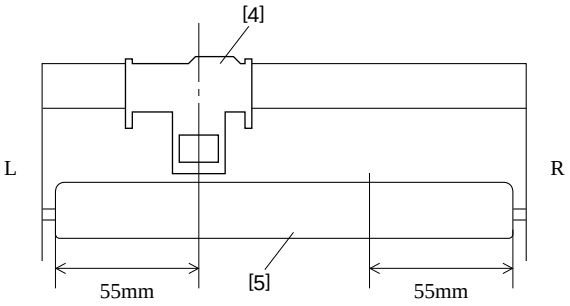

Fig. 3-2 Positioning the carriage unit

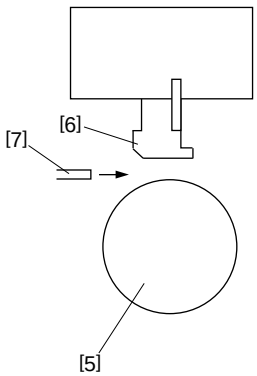

Fig. 3-3 Gap measurement

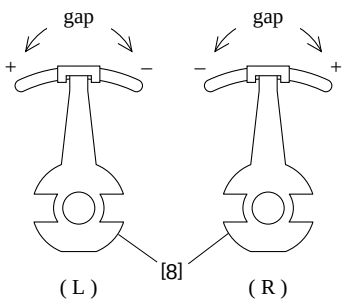

Fig. 3-4 Adjusting bushing

2. Adjustment of Timing Belt Tension

(1) Remove the front case unit according to the procedures described in chapter 4.
(2) Move the carriage unit [1] up to the extreme right position.
(3) Move the screw [3] fixing tension lever assembly [2] approximately 1mm to loosen the tension, then tighten the screw.
The timing belt tension [4] is determined by the spring [5].

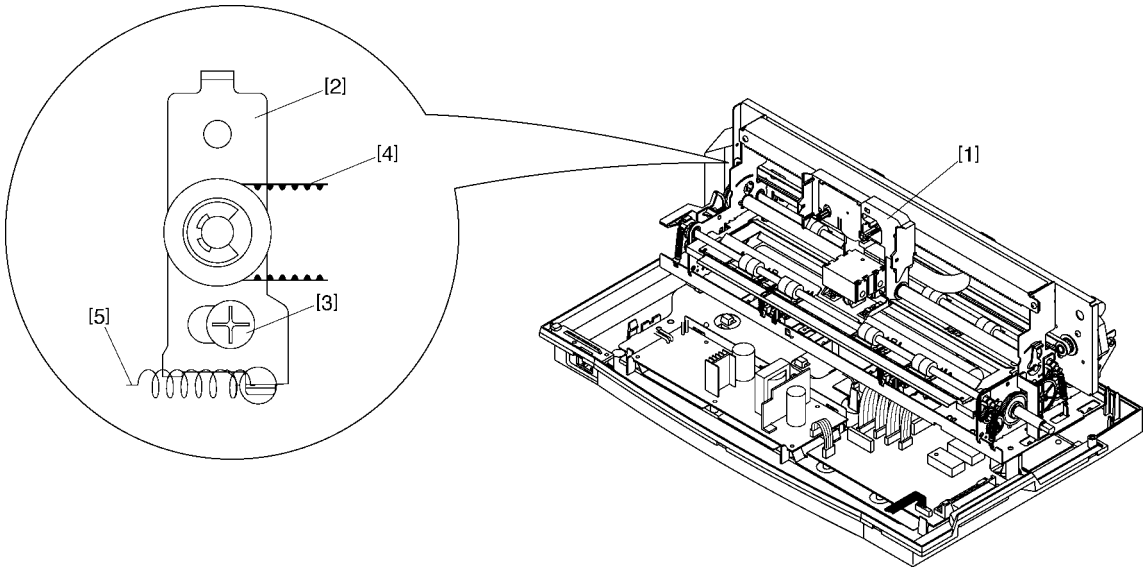

Fig 3-5 Adjustment of timing belt tension

CHAPTER 4
PARTS REPLACEMENT

This chapter explains disassembly and reassembly of the printer. Note the following regarding disassembly and reassembly.

1. Disconnect the printer from the wall outlet before servicing it.
2. Assy is the reverse of disassembly unless otherwise specified.
3. After reassembly, coat the screw heads with locking sealant.
4. Lubrication information is not provided in this chapter. Refer to section 2 in chapter 5.

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2. Rear Case Unit 35

3. Ribbon Holder 36

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9. Tractor Unit 39

10. Carriage Motor Assy 40

11. Carriage Unit 40

12. Paper Feed Roller A 41

13. Frame Holder 41

14. Paper Guide Assy 42

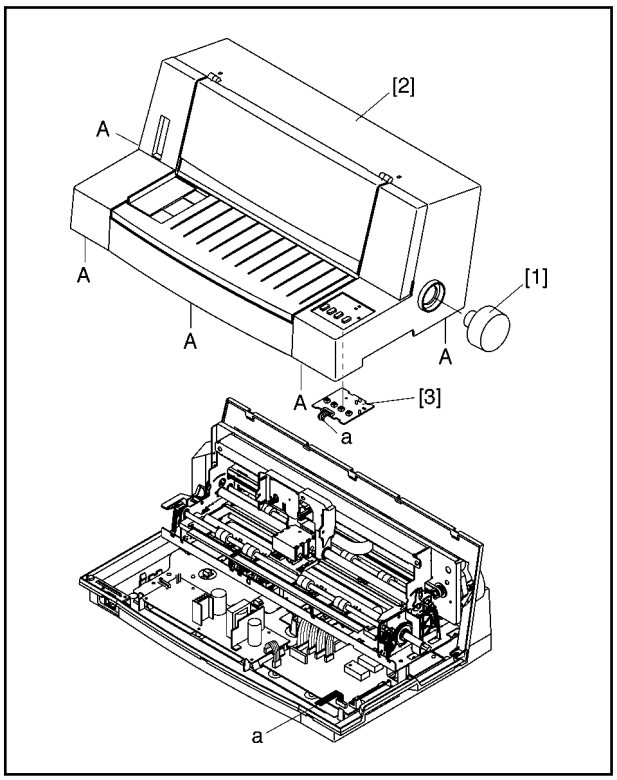
15. Platen Assembly 42

16. Paper Feed Motor Assy 43

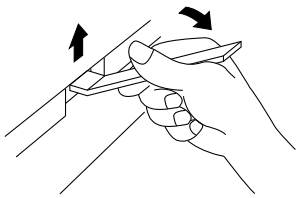
17. Paper Path Change Plate 43

18. Detector 44

1. Front Case Unit

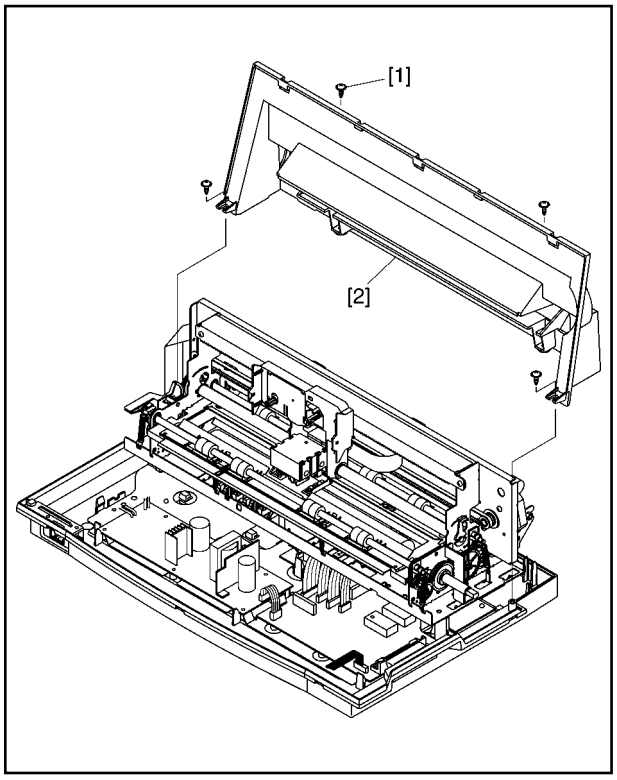


(1) Turn off the power switch.
(2) Remove the power cord from the AC output socket.
(3) Remove
- Platen knob unit [1]
- Front case unit [2]
  Detach the five hooks marked A using the tool shown below.



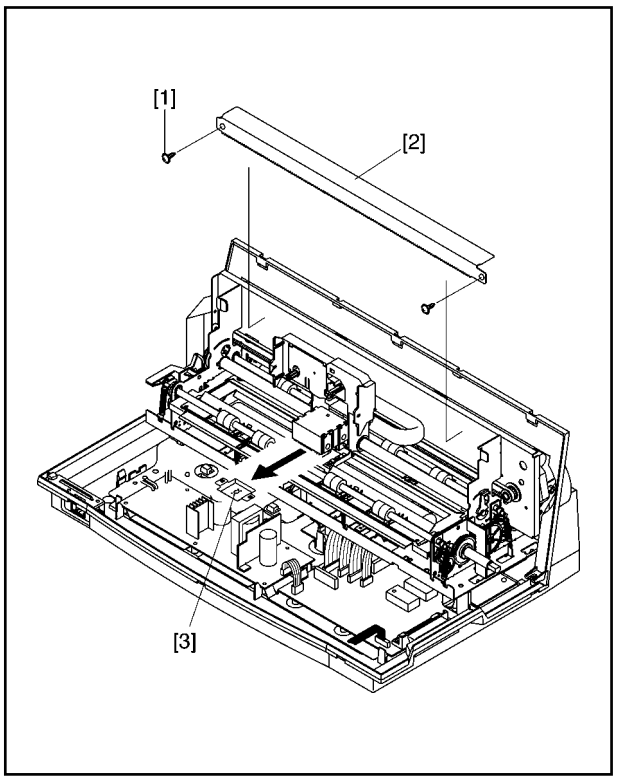
- Control board [3]
  Detach the two hooks.

2. Rear Case Unit



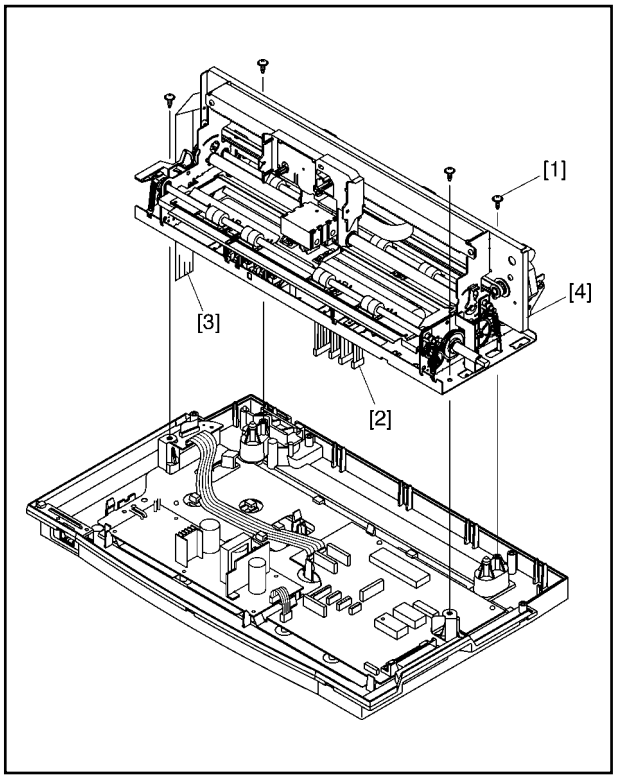
(1) Remove
- Front case unit as described above 1.
- Four screws [1]
- Rear case unit [2]

3. Ribbon Holder



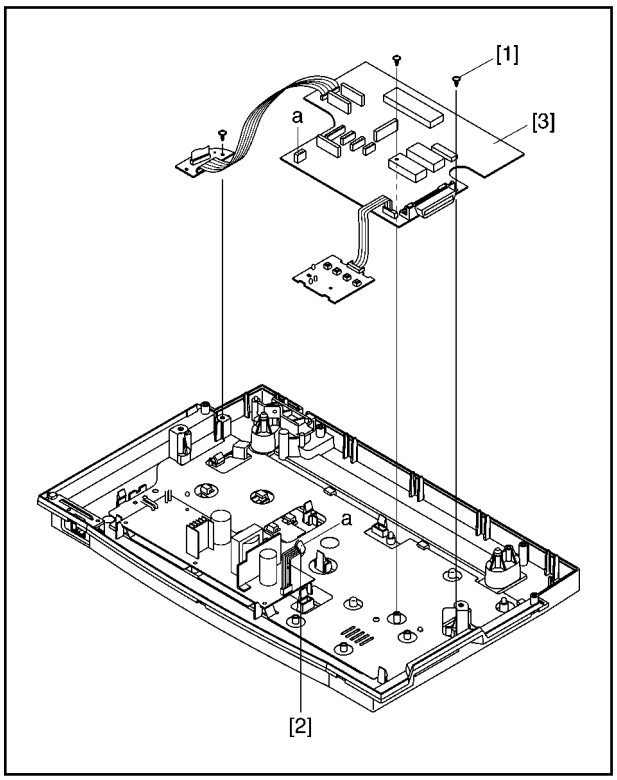
(1) Remove
- Front case unit as described in section 1.
- Two screws [1]
- Rear angle [2]
- Ribbon holder [3]
  Center the carriage unit, tile it, then remove the ribbon holder.

4. Printer Mechanism



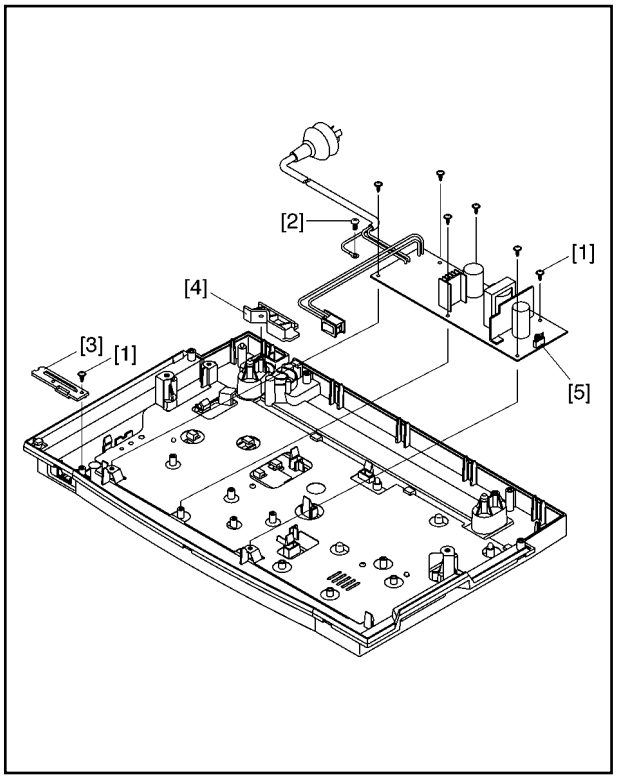
(1) Remove
- Four screws [1]
- Four connectors [2]
- Cable [3]
- Printer mechanism [4]

5. Main Logic Board Unit



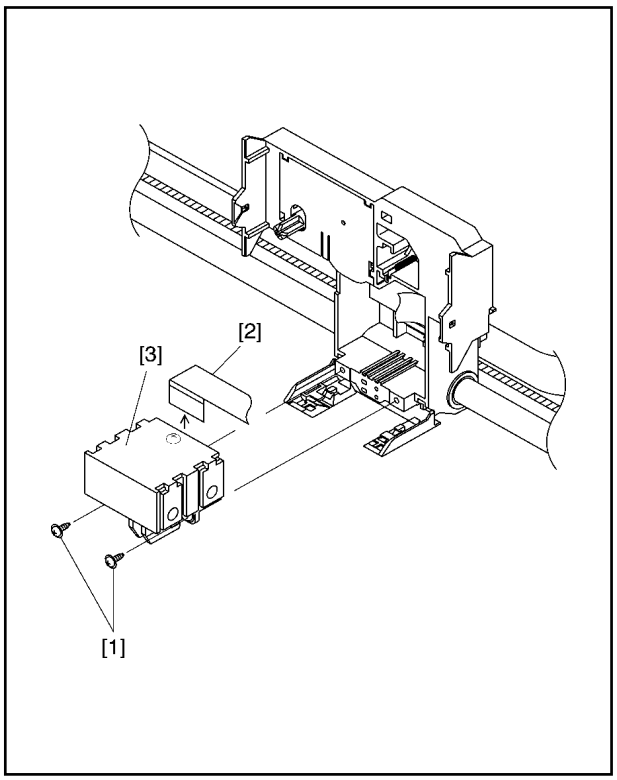
(1) Remove
- Printer mechanism as described in section 4.
- Three screws [1]
- Connector [2]
- Main logic board [3]

6. Power Supply Unit



(1) Remove
- Printer mechanism as described in section 4.
- Seven screws [1]
- Screw [2]
- Switch holder [3]
- Power cord holder [4]
- Power supply unit [5]

7. Print Head

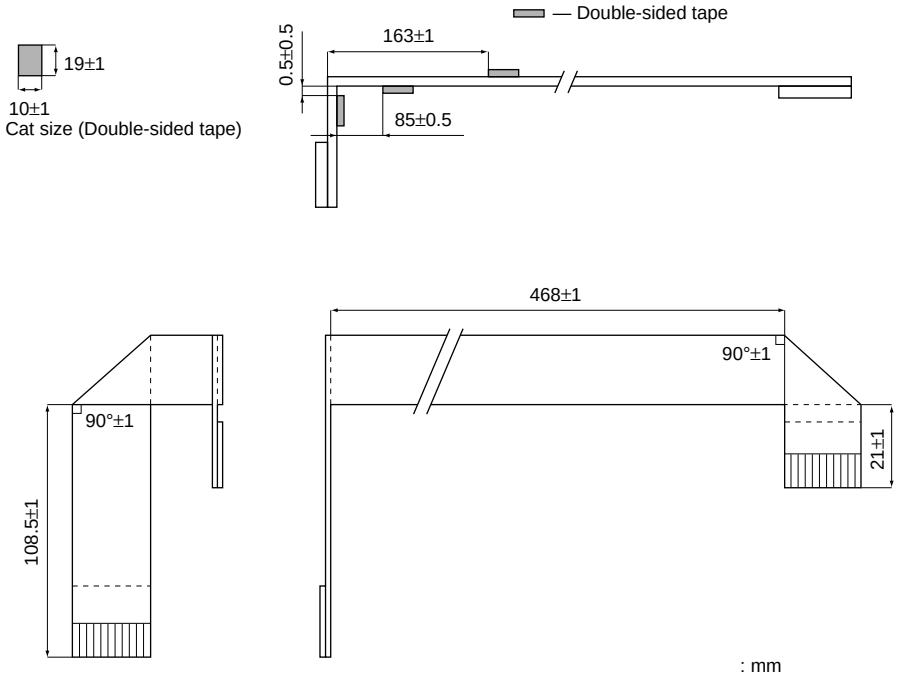


(1) Remove
- Front case unit as described in section 1.
- Two screws [1]
- Cable [2]
- Print head [3]

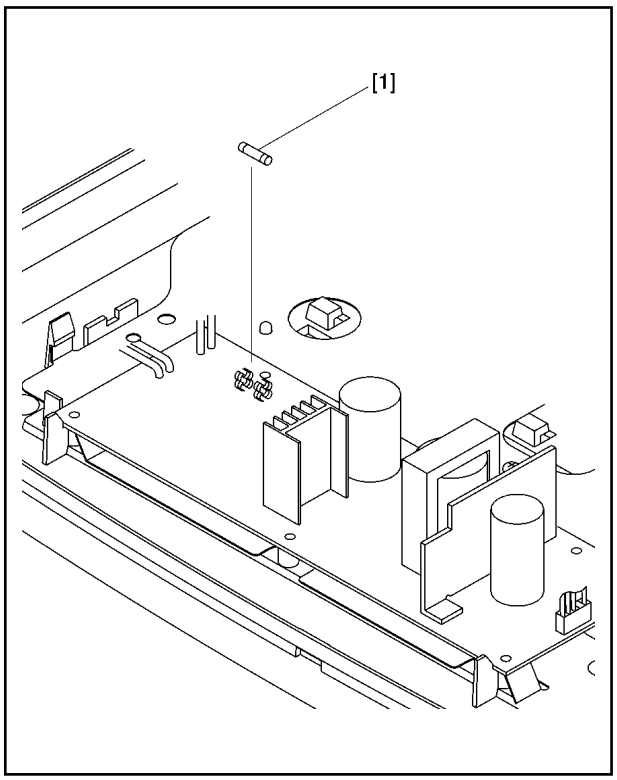
WARNING
The print head gets hot after printing.
Do not touch it until it cools.

(2) Adjust
- Gap between print head and platen. Refer to section 1 of Chapter 3.

Note:
Fold the head cables according to the dimensions shown below.



8. Fuse



(1) Remove
- Front case unit as described in section 1.

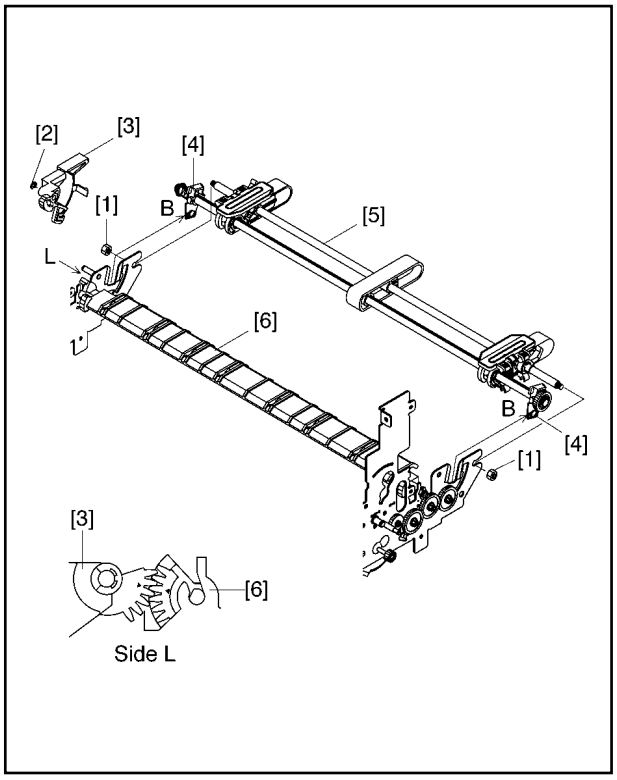
(2) Inspect
- Fuse F1 [1]

Defective → Replace fuse as follows:

AC voltage	Fuse Type
110/120V	5TT2A-250V
220V/240V	215-1A-250V

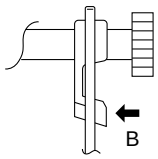
New fuse blown → Inspect circuit

9. Tractor Unit



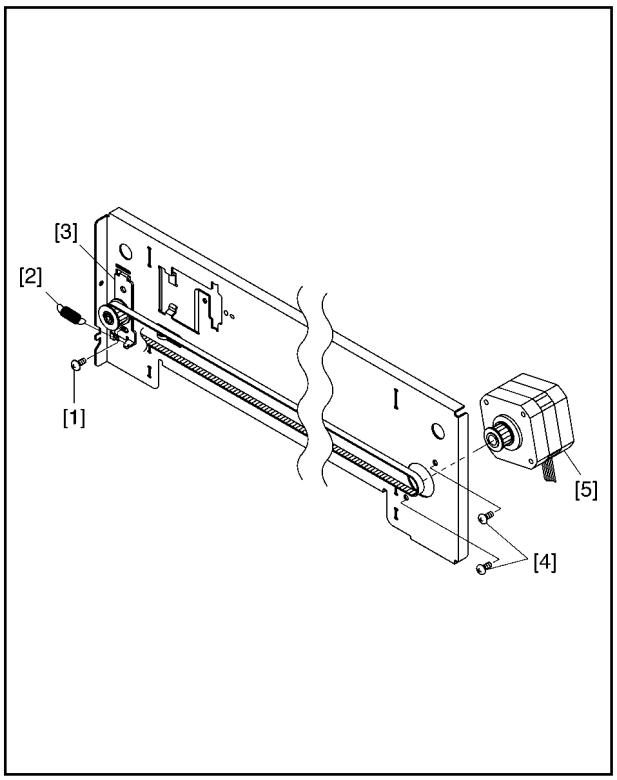
(1) Remove
- Rear case unit as described in section 2.
- Two hexagonal nuts [1]
- Stop ring [2]
- Release lever [3]
- Tractor unit [5]

  Push tractor bushing [4] with a screwdriver and lift tractor unit [5].



Note:
Align the "Δ" mark on the release lever [3] with the "Δ" mark on the paper path change plate [6].

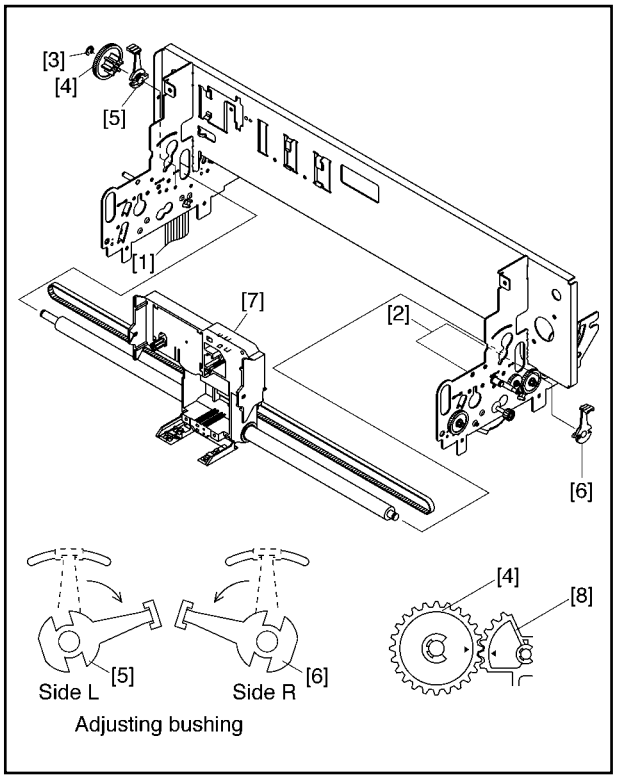
10. Carriage Motor Assy



(1) Remove
- Rear case unit as described in section 2.
- Screw [1]
- Spring [2]
  Set tension lever assy [3] in the unlocked position.
- Two screws [4]
- Carriage motor unit [5]

Note:
When assembling the carriage motor assy, the tension lever assy [3] must be secured with the screw [1] when the spring [2] is in place.

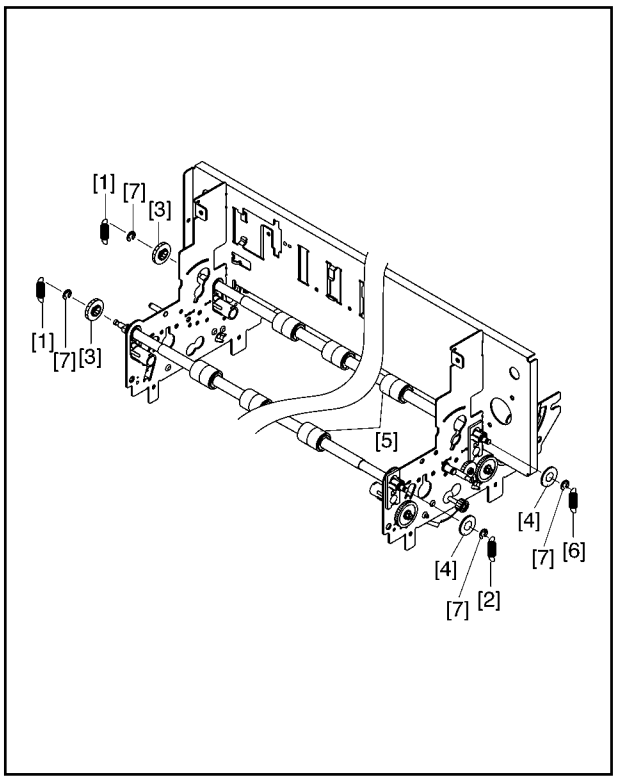
11. Carriage Unit



(1) Remove
- Ribbon holder as described in section 3.
- Print head as described in section 8.
- Head cable [1]
- Ground spring [2]
- Stop ring [3]
- Adjusting gear [4]
- Adjusting bushings L, R [5] [6]
  Adjusting bushings L/R can be removed by turning them.
- Carriage unit [7]
  Center the carriage unit.

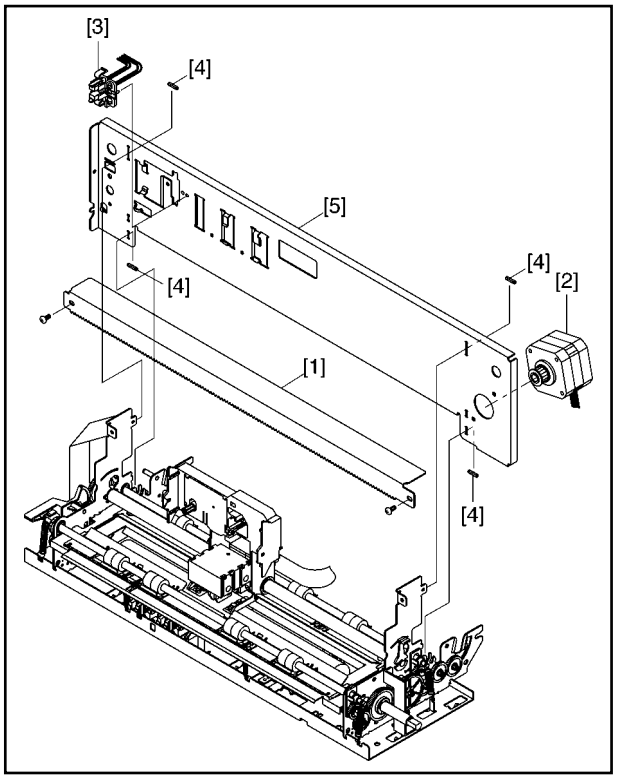
Note:
Move the carriage unit to the center position, then align the "Δ" mark of adjusting gear [4] with the "Δ" mark of adjusting lever [8].

12. Paper Feed Roller Assy



(1) Remove
- Carriage unit as described in section 11
- Four springs [1], [2], [6]
- Four stop rings[7]
- Two gears [3]
- Two plain washer [4]
- Tow paper feed roller Assy [5]

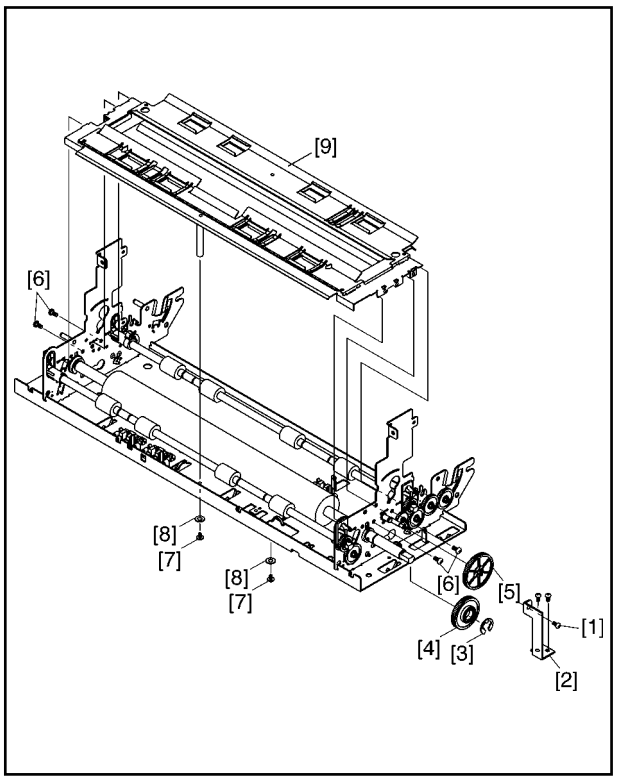
13. Frame Holder



(1) Remove
- Rear angle [1]
- Carriage motor unit [2] as described in section 8
- Home position detector [3]
- Four roll pins [4]
- Frame holder [5]

Note:
Roll pins [4] should not be used again once they have been removed. Always use new ones.

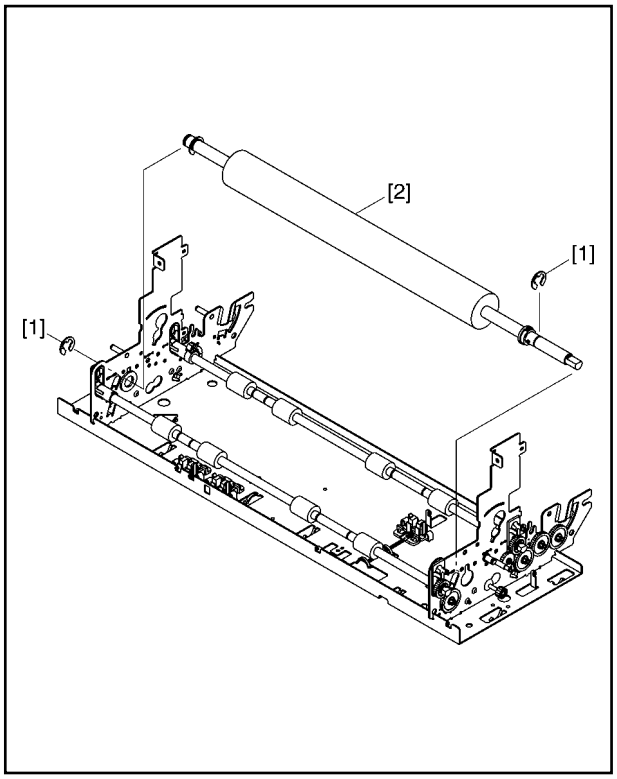
14. Paper Guide Assy



(1) Remove
- Paper feed roller Assy as described in section 12.
- Three screws [1]
- Frame support (R) [2]
- Stop ring [3]
- Platen gear [4]
- Gear [5]
- Frame holder as described in section 13.
- Four screws [6]
- Two screws [7]
- Two washers [8]
- Paper guide assy [9]

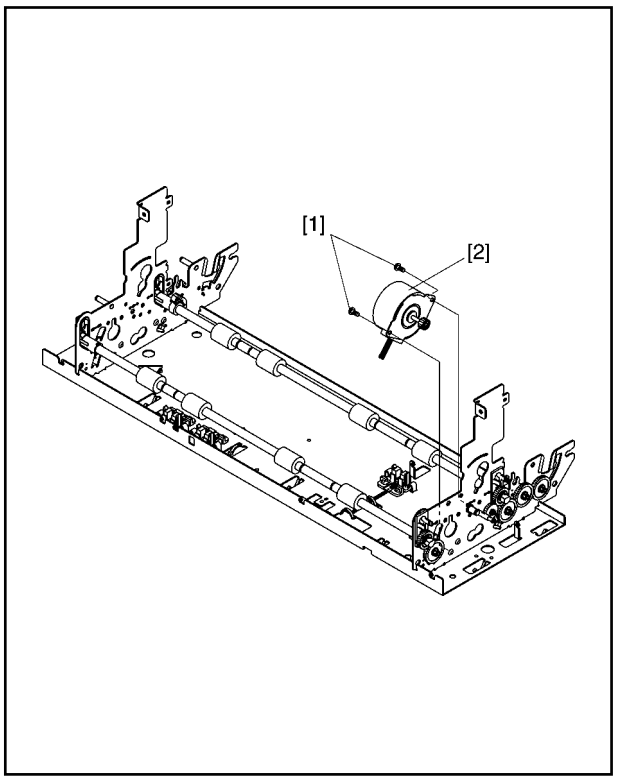
Note:
Gears [4],[5] should not be used again once it has been removed. Always use a new one.

15. Platen Assy



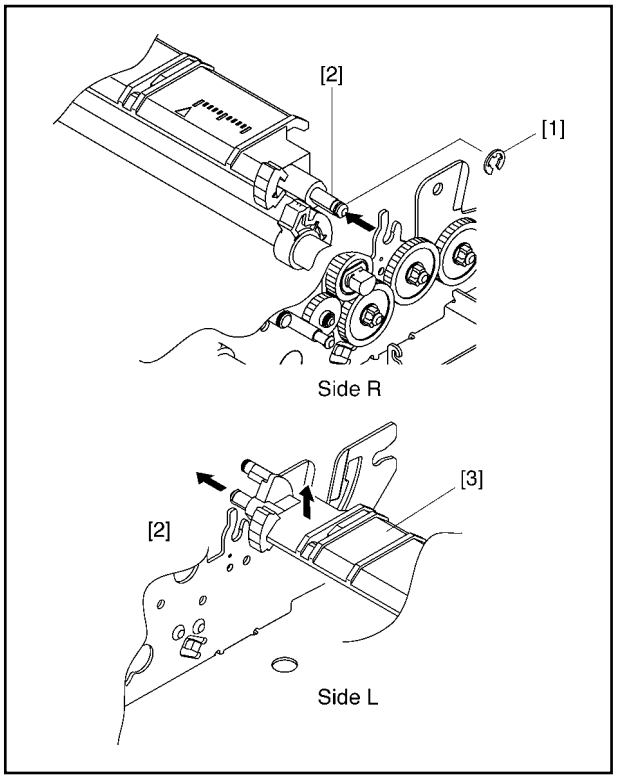
(1) Remove
Paper guide assy as described in section 14.
- Two stop rings [1]
- Platen assy [2]

16. Paper Feed Motor Assy



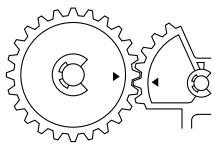
(1) Remove
Platen assy as described in section 15.
- Two screws [1]
- Paper feed motor assy [2]

17. Paper Path Change Plate

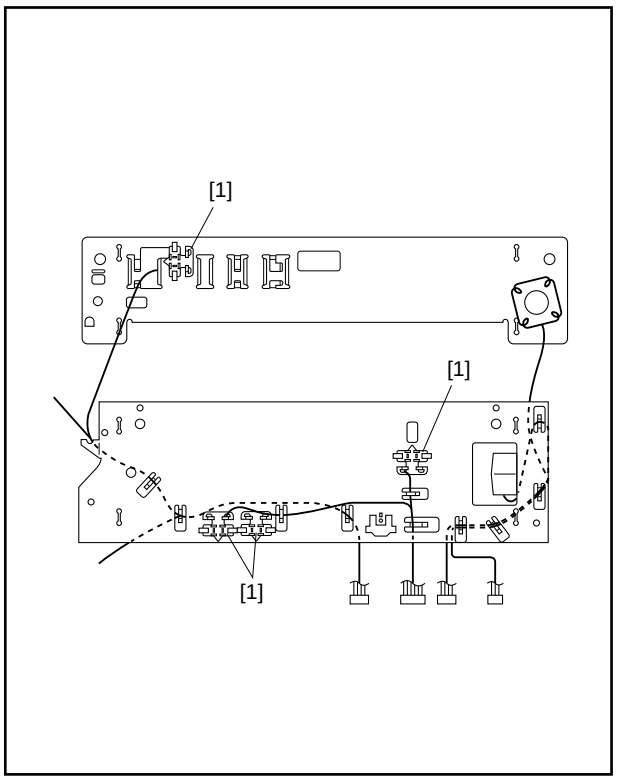


(1) Remove
- Paper feed roller A as described in section 12.
- Right stop ring [1]
- Right release shaft [2]
  Push inwards.
- Left release shaft [2]
  Pull the shaft outwards until the slot is exposed.
- Paper path change plate [3]

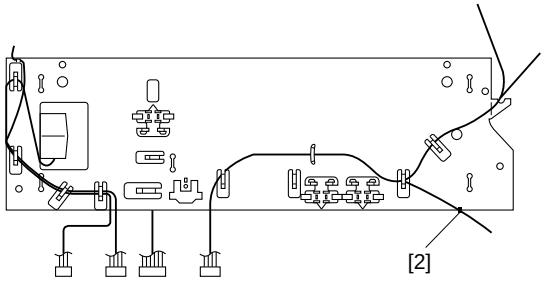
Note:
Align the "Δ" mark on the paper path change plate with the "Δ" mark on the release gear.



18. Detector



(1) Remove
- Paper guide assy as described in section 14.
- Four detectors [1]
  Note:
  Secure the lead wires at one point using fasteners [2] .



Solder side

CHAPTER 5
MAINTENANCE AND LUBRICATION

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1-2. Checks 47

2. Lubrication 48

2-1. Lubricant 48

2-2. Lubricating Method 48

2-3 Lubricated Areas 48

1. Maintenance

In order to maintain the optimum performance of this printer and to prevent trouble, maintenance must be carried out according to the following items.

1-1. Cleaning

(1) Removal of dirt

Wipe off dirt with a soft cloth soaked in alcohol or benzine.

*Note: Do not use thinner, trichlene or ketone solvents because they may damage plastic parts. Also during cleaning, be careful not to moisten or damage electronic parts, wiring, or mechanical parts.

(2) Removal of dust, pile, etc.

Vacuum cleaning (with an electric cleaner) is preferred. Remove all dust, etc., inside the printer.

*Note: After cleaning, check the oil level. If it is not adequate due to cleaning, replenish it.

1-2. Checks

Checks must be carried out at two levels: a “daily check” which the operator can easily carry out during operation, and a “periodic check” which an expert should carry out.

(1) Daily check

When the printer is used on a daily basis, check that the printer is used properly. Make sure that the printer is operating under the best conditions.

- Is any paper stuck in the paper box or printer case?
- Is the cartridge ribbon set at the right position?
- Is there any foreign matter inside the printer? (Remove if any.)
- Is the print head getting excessively dirty?

(2) Periodic check

After 6 months or printing 1 million lines, the periodic check and lubrication must be carried out.

- Check for deformation of springs.
- Check the gap between the platen and the print head.
- Remove dust, dirt, etc., around the detectors.

2. Lubrication

Lubrication is very important to maintain optimum performance and to prevent trouble.

2-1. Lubricant

The type of lubricant greatly affects the performance and durability of the printer, especially in a low temperature environment. We recommend use of the grease and lubrication oils listed below for this printer

Type of oil	Product name	Maker
Grease	MOLYKOTE EM-30L	DOW CORNING ASIA LTD
Lubricant	Mobil 1	Mobil oil

2-2. Lubricating Method

When lubrication is carried out in assembly and disassembly, wash parts well to remove dust and dirt before lubrication. Lubrication must be carried out regularly once every 6 months or after 1 million lines have been printed. Lubrication is necessary irrespective of the regular lubrication whenever lubricant becomes deficient after cleaning or whenever parts have been disassembled or replaced.

2-3. Lubricated Areas

NO.	LubricationProduct	Name
[1]	Rubbing surfaces of pully bushing B,Timing pulley and Shaft	EM-30L
[2]	Rubbing surfaces of Release lever and Frame	EM-30L
[3]	Rubbing surfaces of Release lever spring and Frame	EM-30L
[4]	Rubbing surfaces of Adjusting lever and Frame	EM-30L
[5]	Rubbing surfaces of Springs and Paper feed roller B	EM-30L
[6]	Rubbing surfaces of Carrige stay	Mobil 1
[7]	Rubbing surfaces of Gear 32x0.5 and Shaft	EM-30L
[8]	Rubbing surfaces of Idler gear 16x72x0.5 and Shaft	EM-30L
[9]	Rubbing surfaces of PF roller assy and Roller holder L.R	EM-30L
[10]	Rubbing surfaces of Paper feed loller B and Roller holder L.R	EM-30L
[11]	Rubbing surfaces of Platen washer and Stopring	EM-30L
[12]	Rubbing surfaces of Gear cover and Shaft	EM-30L
[13]	Rubbing surfaces of Idler assy and Gear cover	EM-30L
[14]	Rubbing surfaces of Ribbon cassette gear and Gear cover	EM-30L
[15]	Rubbing surfaces of Gear,idler and Shaft	EM-30L
[16]	Rubbing surfaces of Rear loller and Shaft	EM-30L
[17]	Rubbing surfaces of Tractor shaft and Release lever	EM-30L
[18]	Rubbing surfaces of Tractor shaft	EM-30L
[19]	Rubbing surfaces of Gear and Shaft	EM-30L

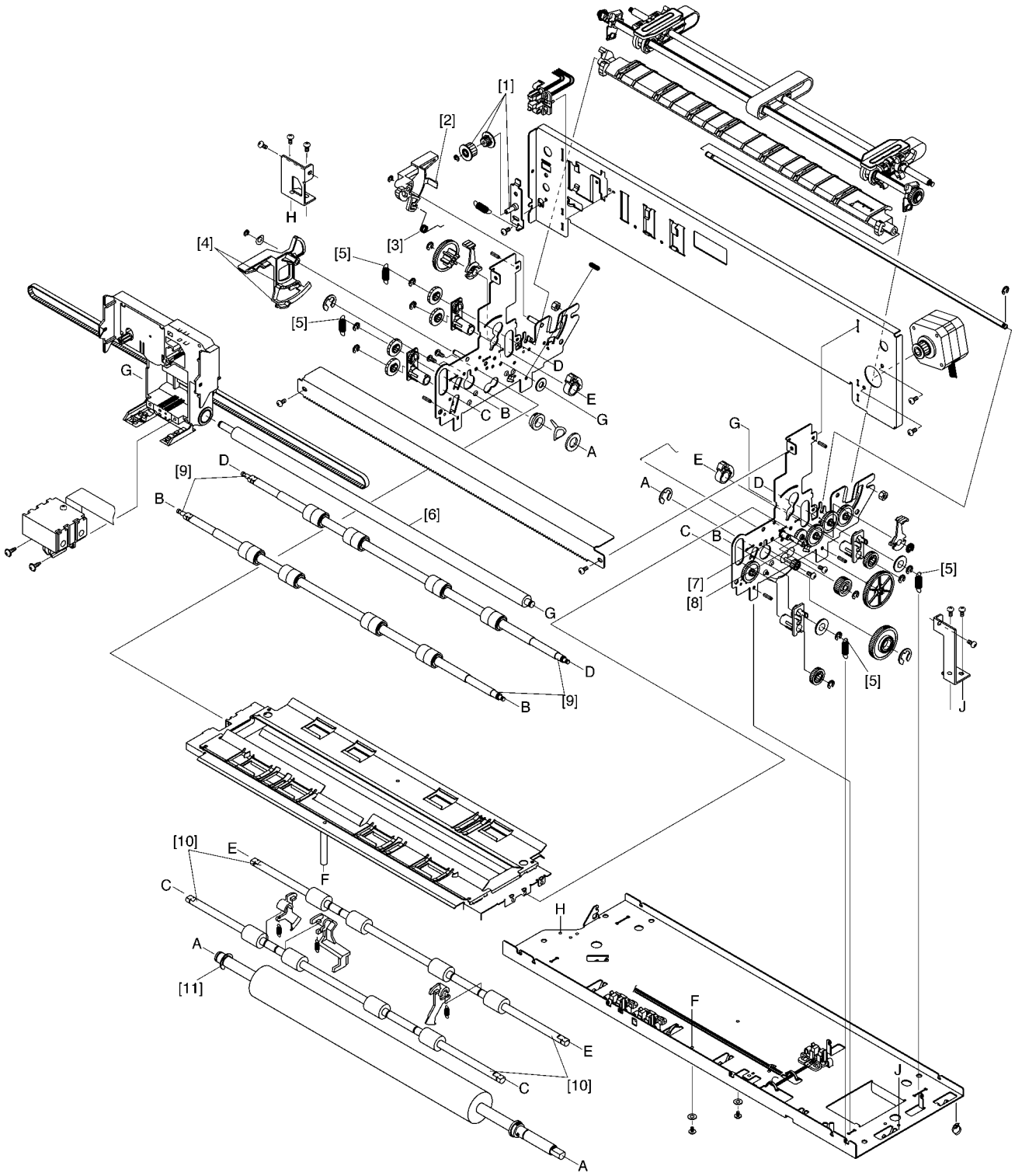

Fig. 5-1 Lubricated Areas (printer mechanism)

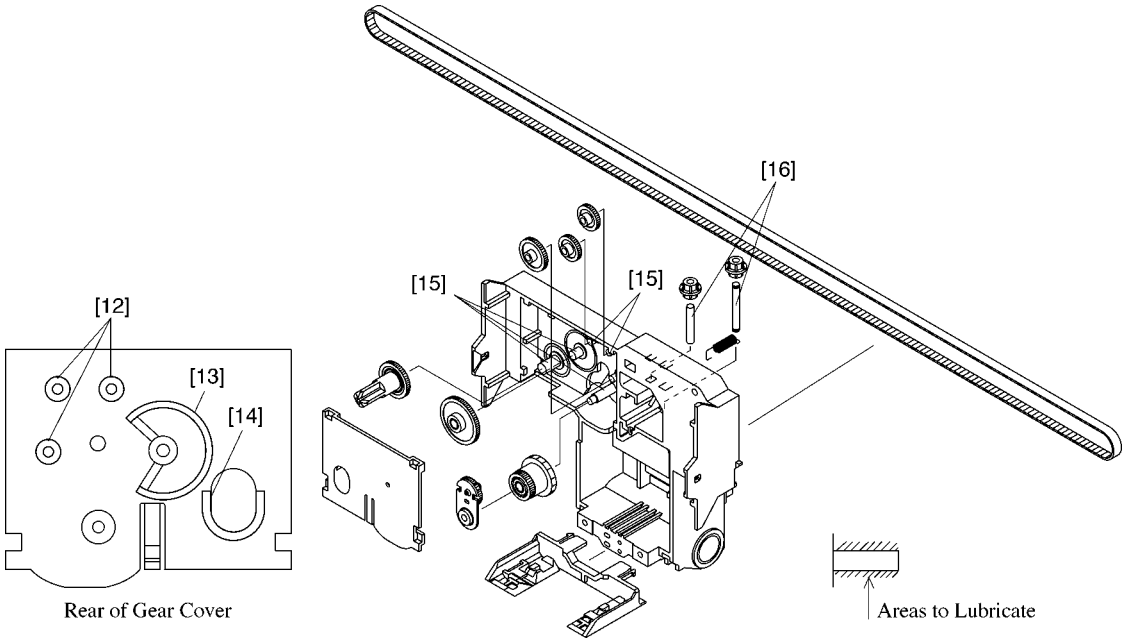

Fig. 5-2 Lubricated Areas (Carriage unit)

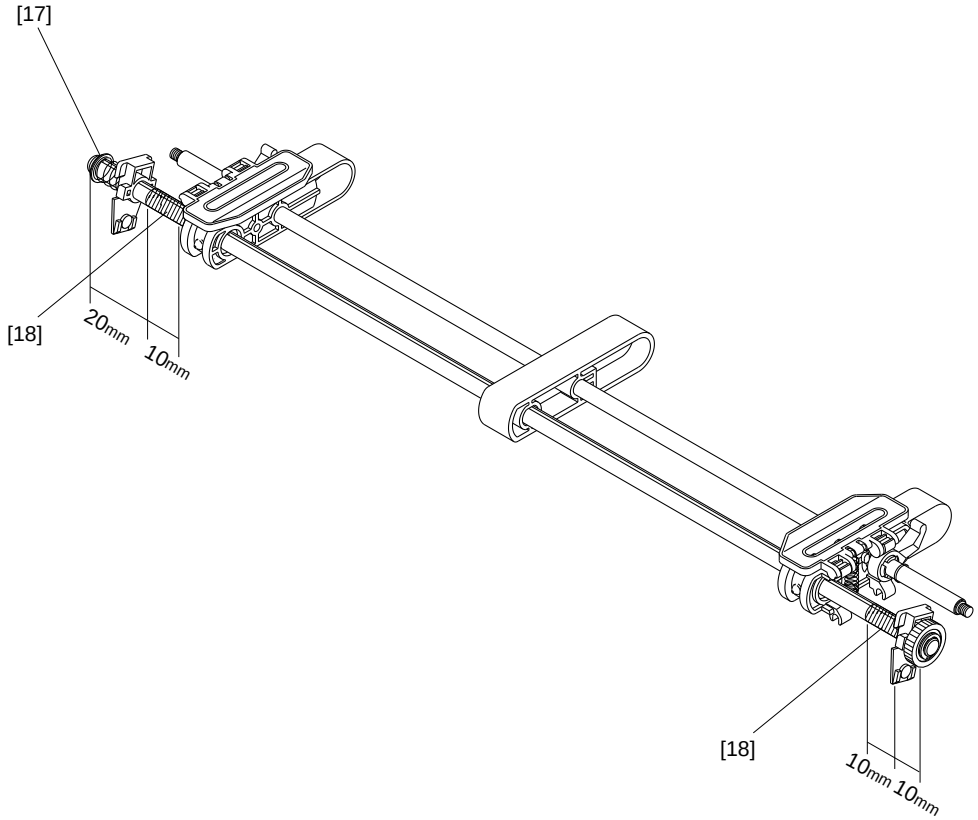

Fig. 5-3 Lubricated Areas (tractor unit)

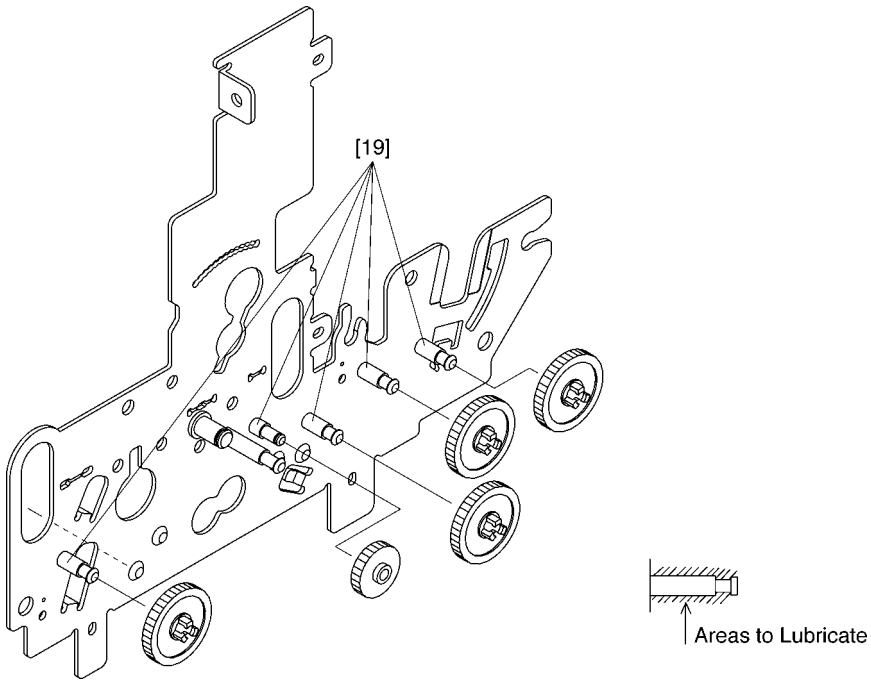

Fig. 5-4 Lubricated Areas (Frame R unit)

CHAPTER 6
TROUBLESHOOTING

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3. Repair by Unit Replacement 57

4. Repair by Parts Replacement 63

   4-1. Does not Operate at All with Power on 63

   4-2. Power Supply Circuit Abnormal 64

   4-3. Defective Motor Operation 65

   4-4. Defective Print Head Operation 66

   4-5. Defective Interface Operation 67

1. Troubleshooting Procedures

Troubleshooting is never easy because various problems arise depending upon the particular location of the breakdown. The following procedures should be taken in making repairs.

(1) The first method is to make repairs through unit replacements. The two display codes appearing in the flow chart are defined as follows: 1) indicates main logic board replacement; and 2) indicates printer mechanism replacement, to be carried out if the problem has not been corrected.

1)	Main Logic Board Replacement
2)	Printer Mechanism Replacement

Check again at this time whether the replaced unit is malfunctioning. (This is done to rule out trouble caused by improper contact of connectors.)

Replaceable units consist of the following:

- Power supply unit
- Main logic board
- Printer mechanism
- Control panel board

In replacing these units, always refer to the unit replacement priority chart.

(2) The second method is to make repairs by parts replacement to replace defective elements inside a particular unit.

(Note 1) Before starting to repair, be sure to check visually the contact of the connector and the mounting of the IC in the IC socket.

(Note 2) Always turn off power source and remove power plug before replacing any units or parts.

(Note 3) All check items shown in the flow chart must be checked. Otherwise, newly mounted parts or units may become damaged.

(Note 4) If, in the process of making repairs, there is any confusion about proper procedures, restart the job from the beginning.

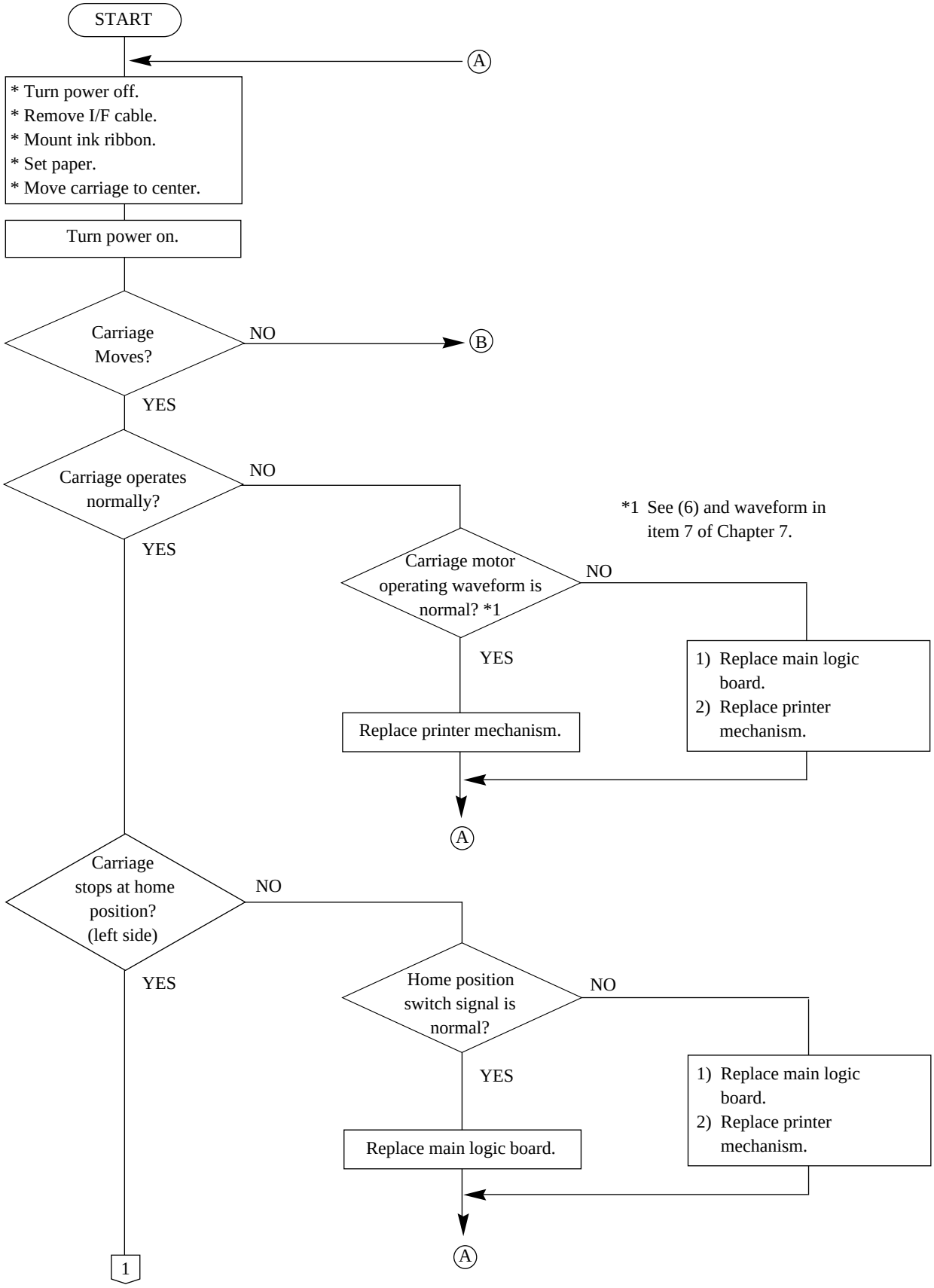
(Note 5) Be careful to avoid injury from static electricity when handling ICs and main logic board.

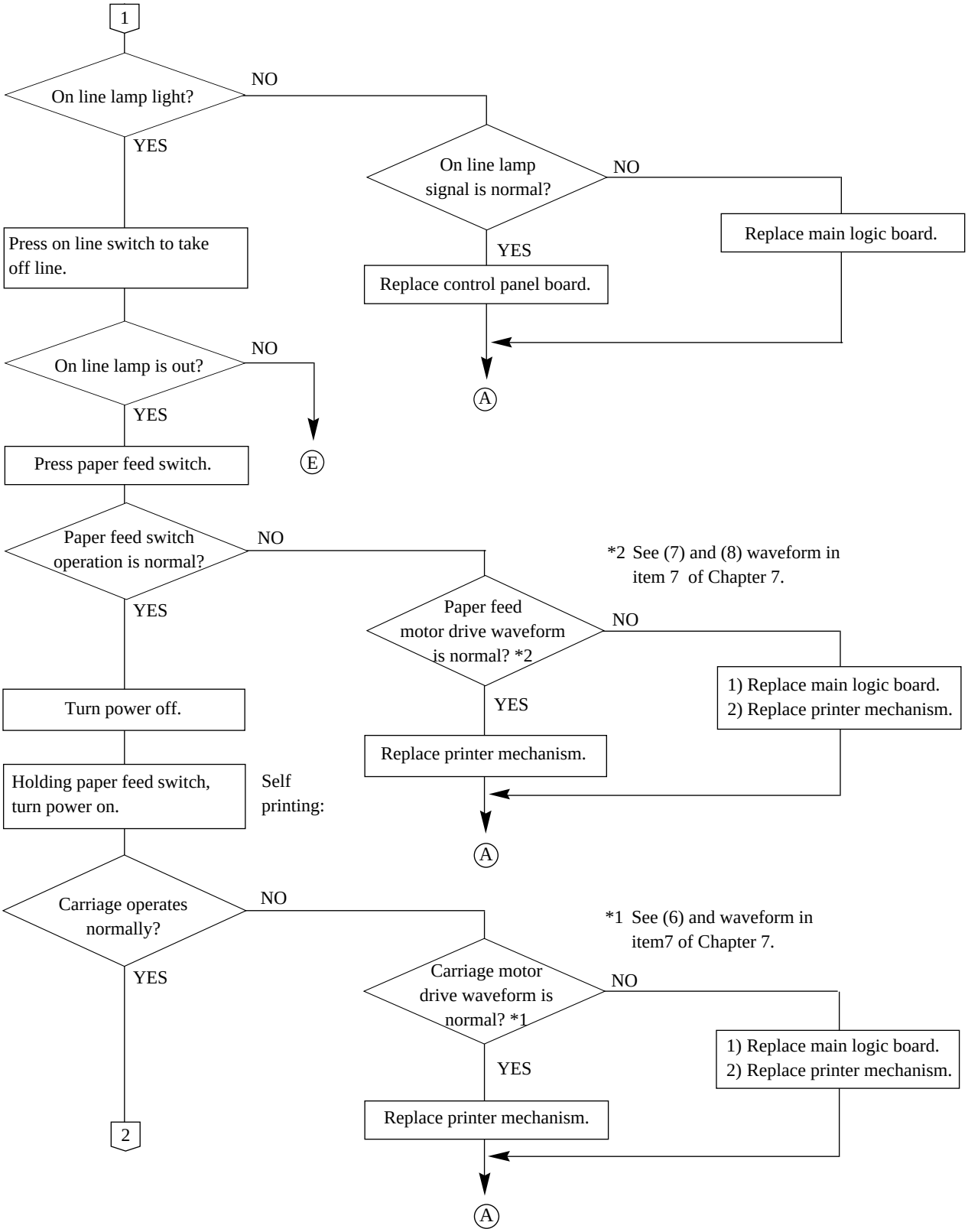
2. Unit Replacement Priority Chart

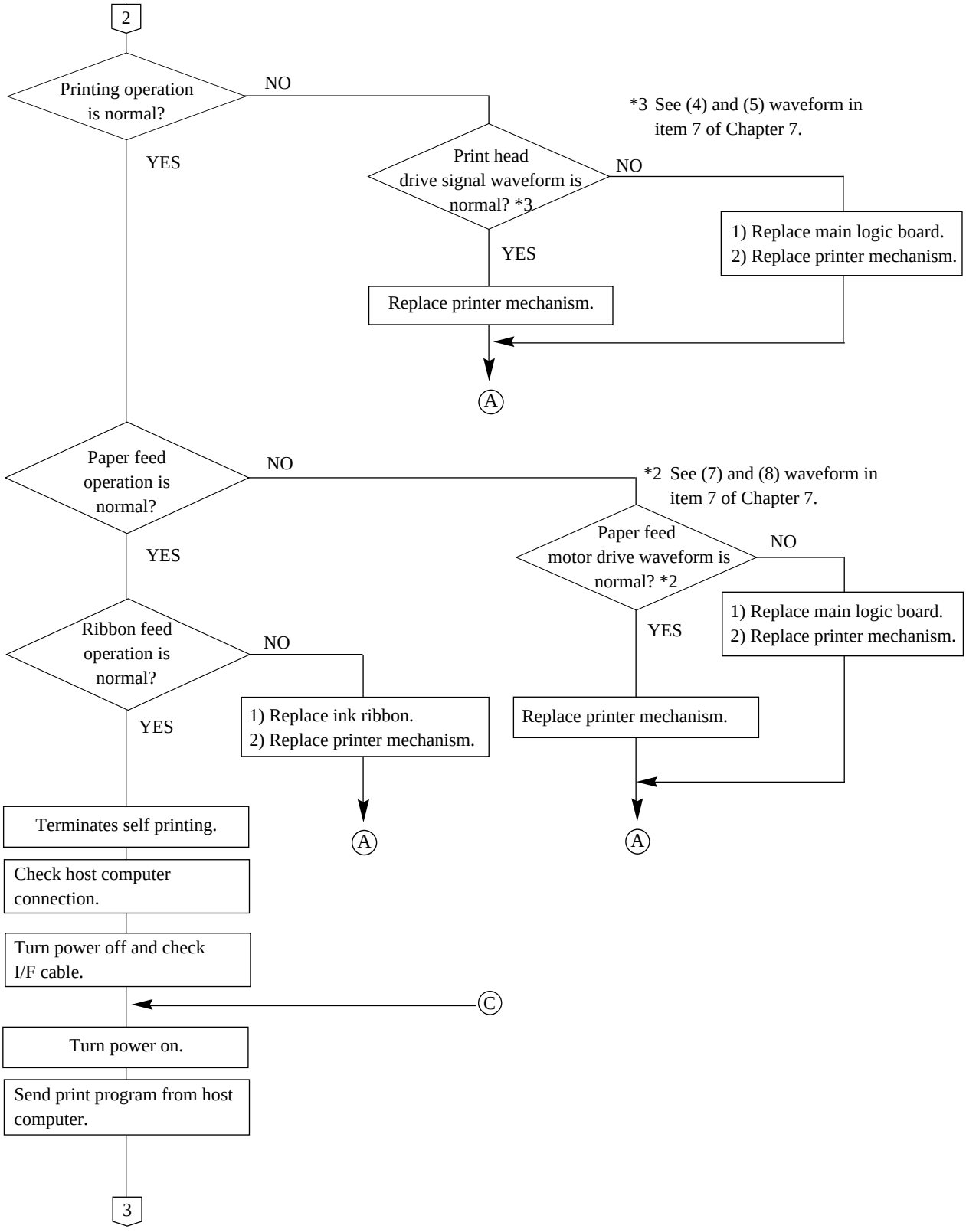
Category	Problem Details	Unit Exchange Sequence				Remarks
		Power supply unit	Main logic board	Printer mechanism	Control panel board	
Operation related	Specific display lamp only will not glow		2		1	
	Specific switch only cannot be input		2		1	
	Buzzer does not sound (sound volume inadequate)		1	2		
Motor related	Strange sounds during operation		1	2		
	No motor holding power (power very weak)	2	1			
Print head related	Dots skipped		2	1		
	Print is too light		2	1		Replace ink ribbon
	Ink ribbon entanglement (wire sticks out)		2	1		
Detector related	Absence of paper not detected		2	1		
	Lever position not detected		1	2		
Interface related and others	Incorrect printing		1			Check I/F cable
	Ink ribbon not forwarded			1		
	No operation at EDS setting		1			
	Faulty operation when power is turned on/off		1			
	Abnormal motor operating speed (slow)		1	2		
	Fuse blown during operation	3	1	2		
Error indication	Error detection of head temperature		2	1		ROMAN lamp blink
	Carriage motor error		2	1		COURIER lamp blink
	Paper handling error		2	1		ORATOR lamp blink
	S. W. I error		1			POWER lamp light
	EE-PROM & RAM error		1			DRAFT lamp blink
	Watch dog timer error		1			POWER lamp light

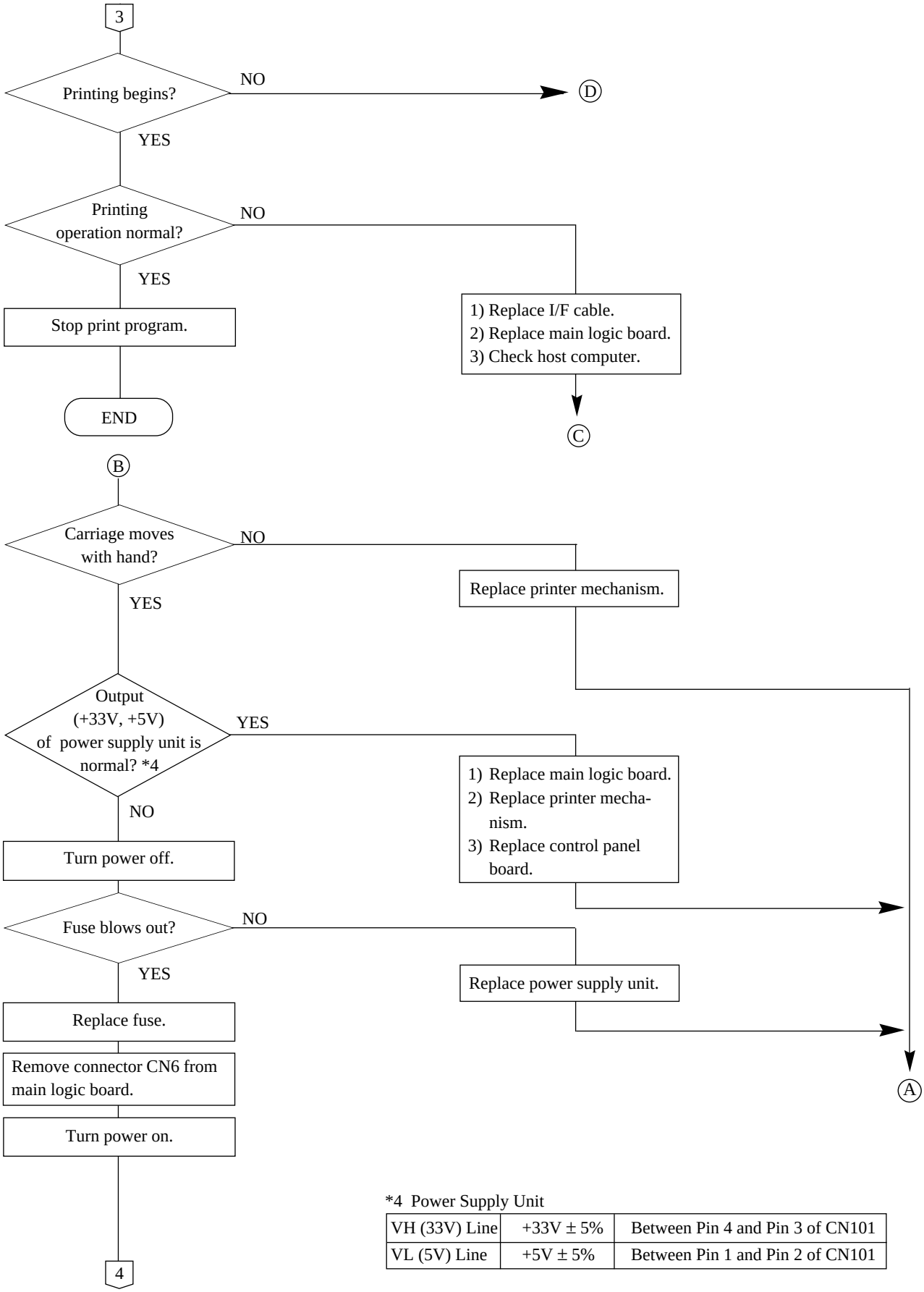
Note: The figures 1, 2 and 3 mean the priority of replacement.

3. Repair by Unit Replacement



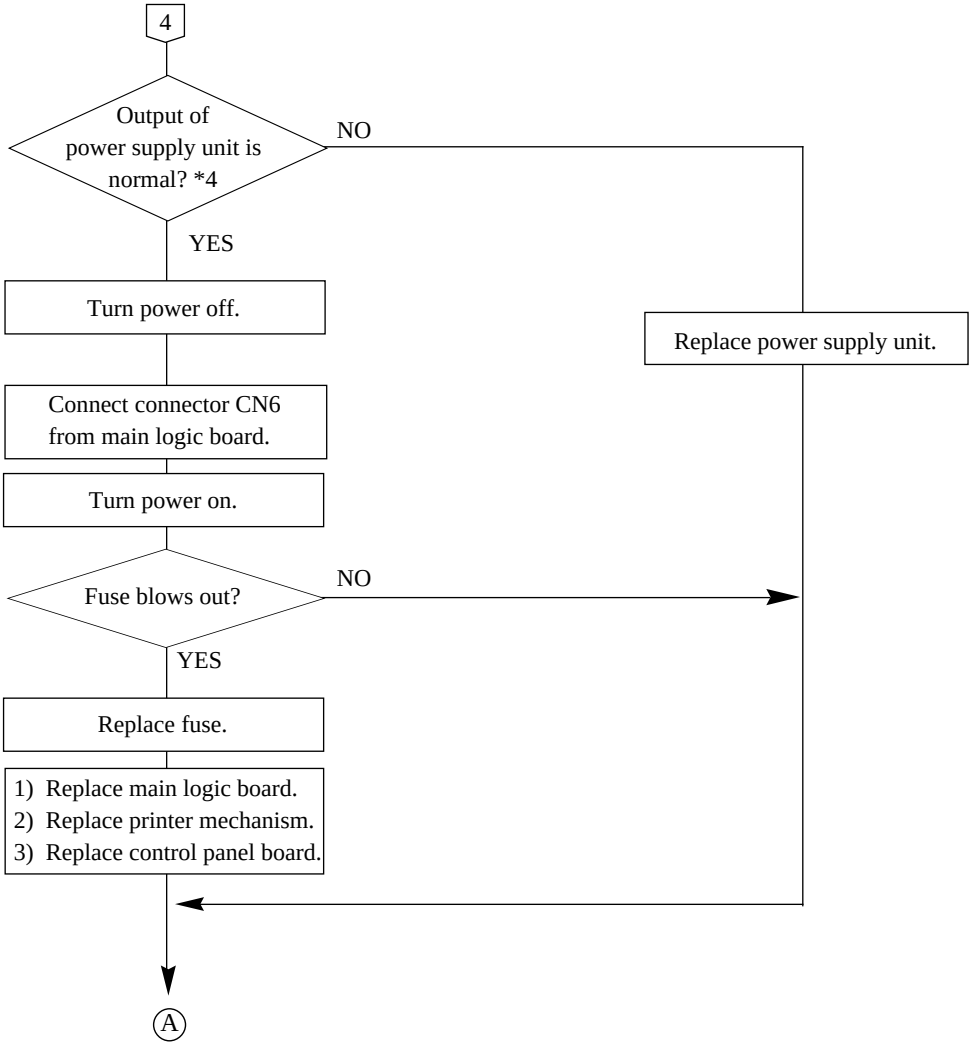

1
On line lamp light?
NO
YES
On line lamp signal is normal?
NO
Replace main logic board.
YES
Replace control panel board.
Press on line switch to take off line.
A
On line lamp is out?
NO
YES
E
Press paper feed switch.
Paper feed switch operation is normal?
NO
*2 See (7) and (8) waveform in item 7 of Chapter 7.
YES
Paper feed motor drive waveform is normal? *2
NO
1) Replace main logic board.
2) Replace printer mechanism.
Turn power off.
YES
Replace printer mechanism.
Holding paper feed switch, turn power on.
Self printing:
A
Carriage operates normally?
NO
*1 See (6) and waveform in item7 of Chapter 7.
YES
Carriage motor drive waveform is normal? *1
NO
1) Replace main logic board.
2) Replace printer mechanism.
YES
Replace printer mechanism.
2
A


2
Printing operation is normal?
NO
YES
*3 See (4) and (5) waveform in item 7 of Chapter 7.
Print head drive signal waveform is normal? *3
NO
YES
1) Replace main logic board.
2) Replace printer mechanism.
Replace printer mechanism.
A
Paper feed operation is normal?
NO
YES
*2 See (7) and (8) waveform in item 7 of Chapter 7.
Paper feed motor drive waveform is normal? *2
NO
YES
1) Replace main logic board.
2) Replace printer mechanism.
Ribbon feed operation is normal?
NO
YES
1) Replace ink ribbon.
2) Replace printer mechanism.
Replace printer mechanism.
A
A
Terminates self printing.
Check host computer connection.
Turn power off and check I/F cable.
C
Turn power on.
Send print program from host computer.
3



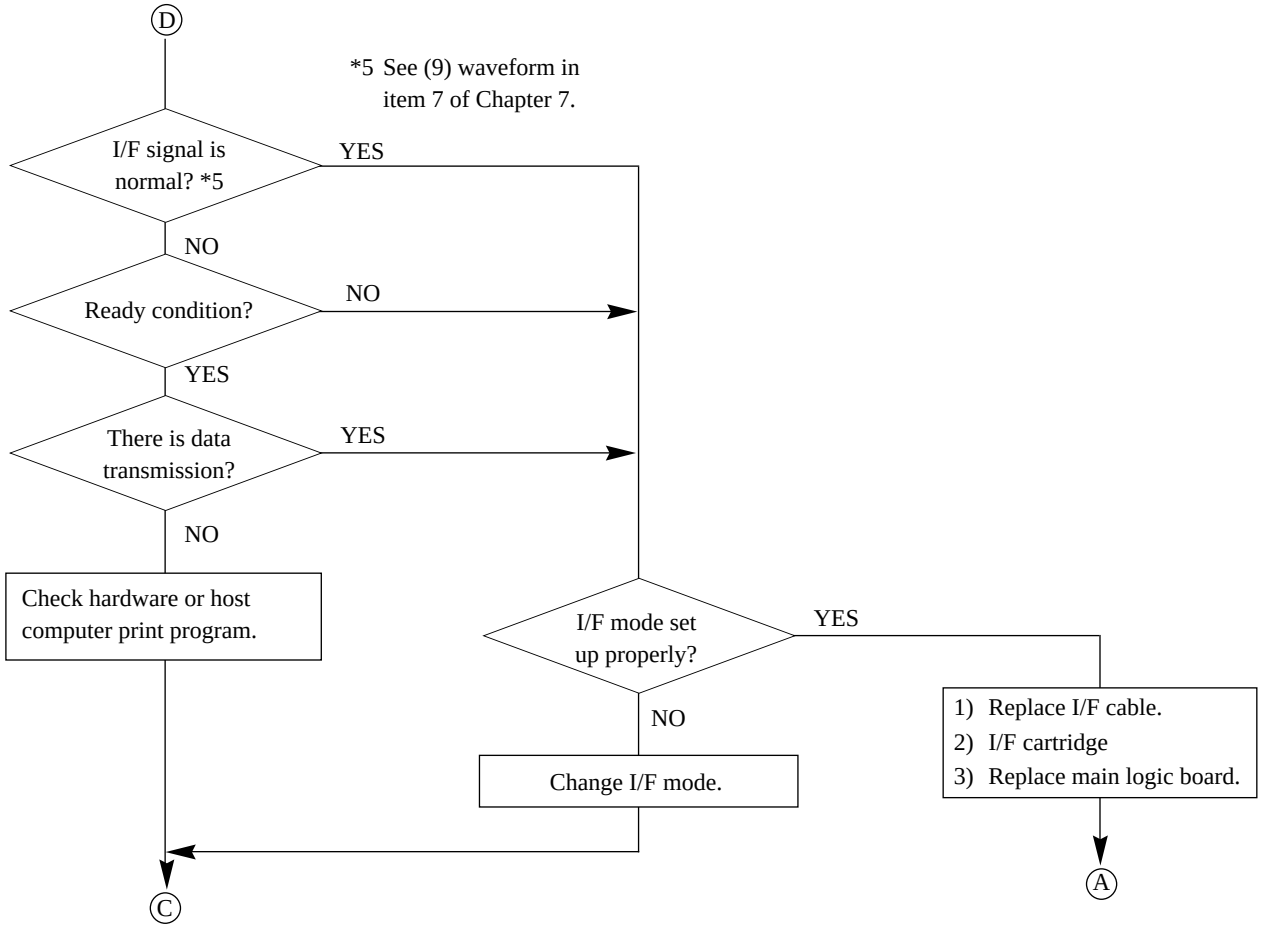
*4 Power Supply Unit

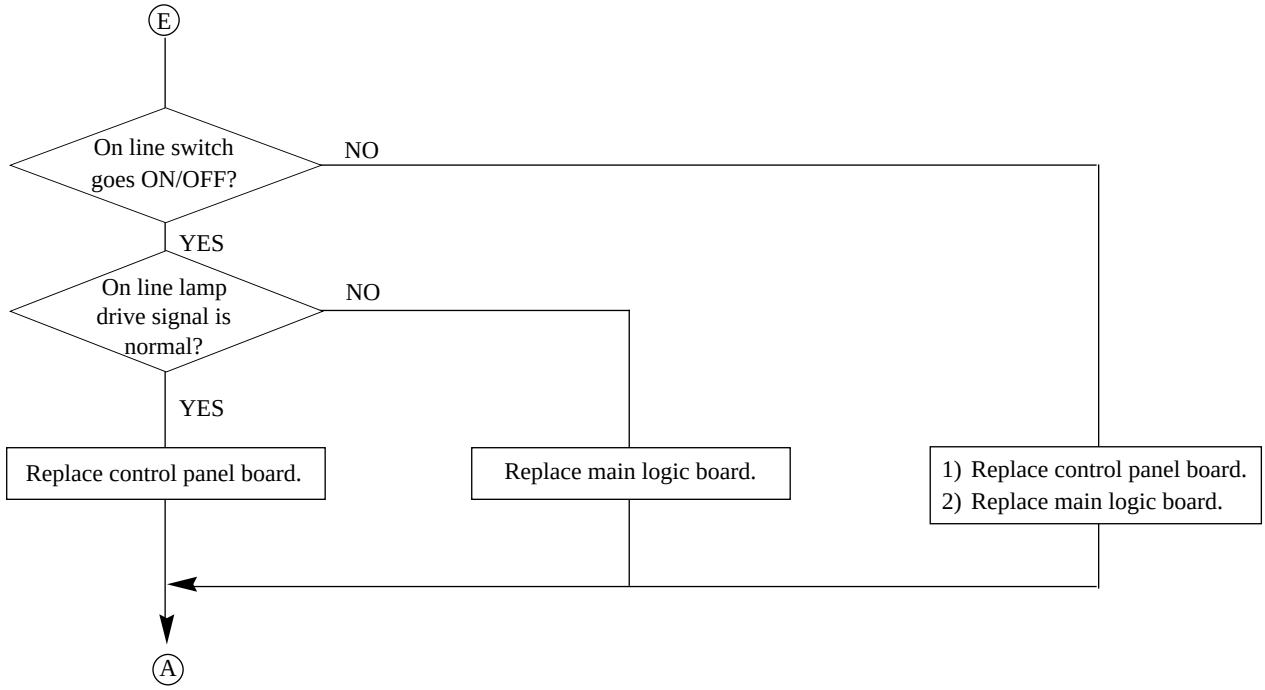
VH (33V) Line	+33V ± 5%	Between Pin 4 and Pin 3 of CN101
VL (5V) Line	+5V ± 5%	Between Pin 1 and Pin 2 of CN101



*4 Power Supply Unit

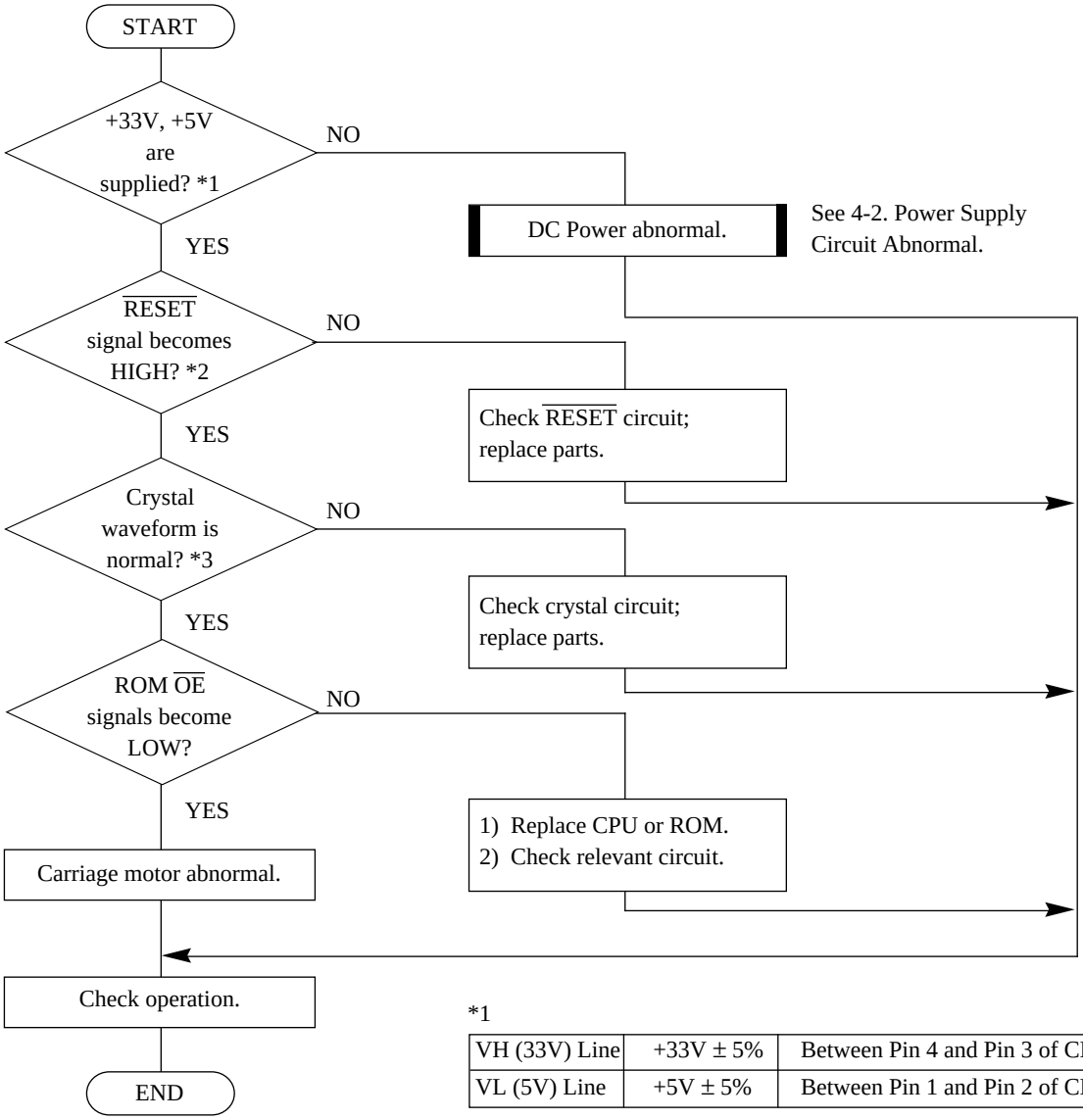
VH (33V) Line	+33V ± 5%	Between Pin 4 and Pin 3 of CN101
VL (5V) Line	+5V ± 5%	Between Pin 1 and Pin 2 of CN101


D
*5 See (9) waveform in item 7 of Chapter 7.
I/F signal is normal? *5
YES
NO
Ready condition?
NO
YES
There is data transmission?
YES
NO
Check hardware or host computer print program.
I/F mode set up properly?
YES
NO
Change I/F mode.
1) Replace I/F cable.
2) I/F cartridge
3) Replace main logic board.
A
C


E
On line switch goes ON/OFF?
NO
YES
On line lamp drive signal is normal?
NO
YES
Replace control panel board.
Replace main logic board.
1) Replace control panel board.
2) Replace main logic board.
A

4. Repair by Parts Replacement

4-1. Does not Operate at All with Power on



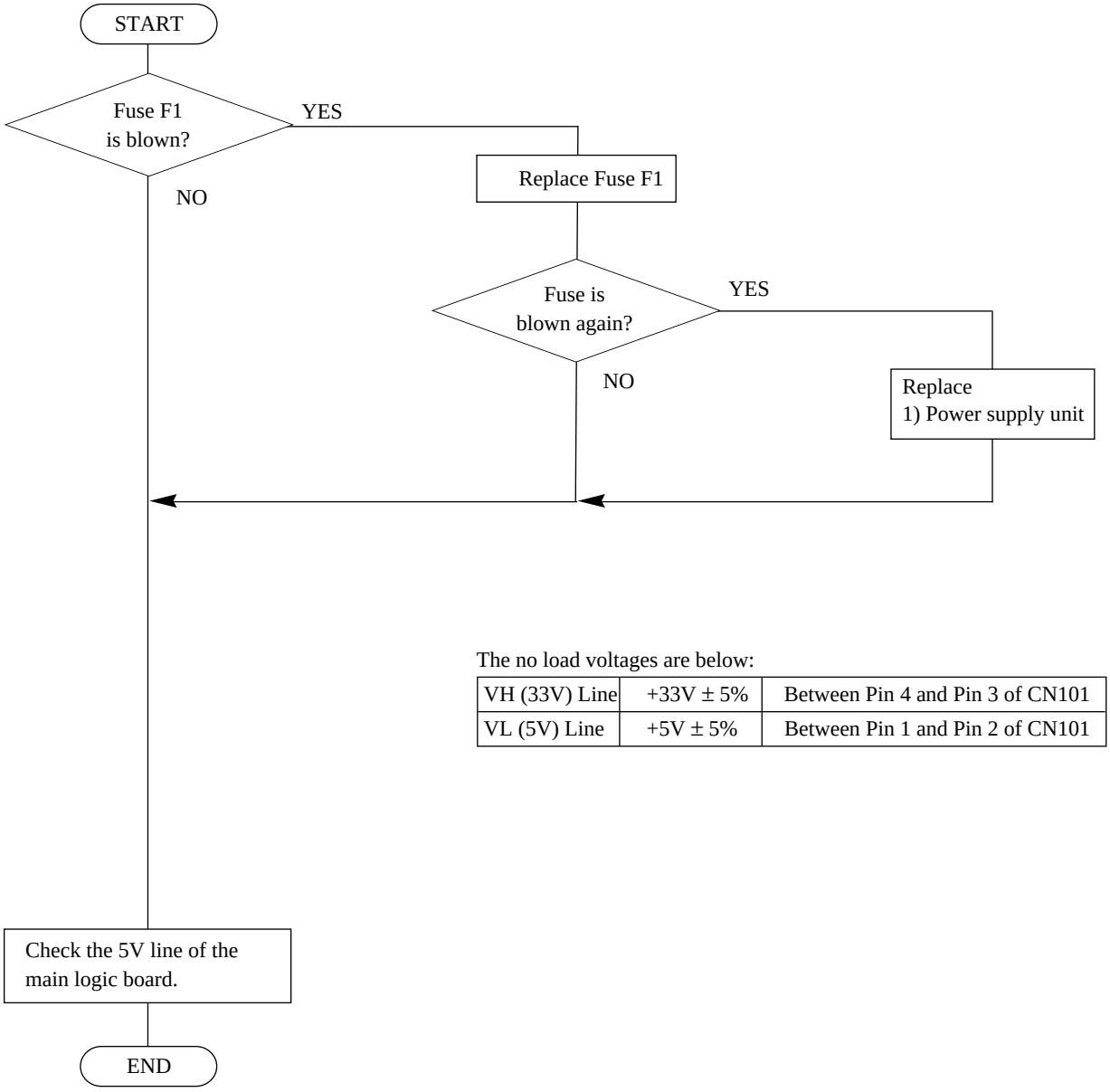
*1

VH (33V) Line	+33V ± 5%	Between Pin 4 and Pin 3 of CN101
VL (5V) Line	+5V ± 5%	Between Pin 1 and Pin 2 of CN101

*2 See (2) waveform in item 7 of Chapter 7.
*3 See (1) waveform in item 7 of Chapter 7.

4-2. Power Supply Circuit Abnormal

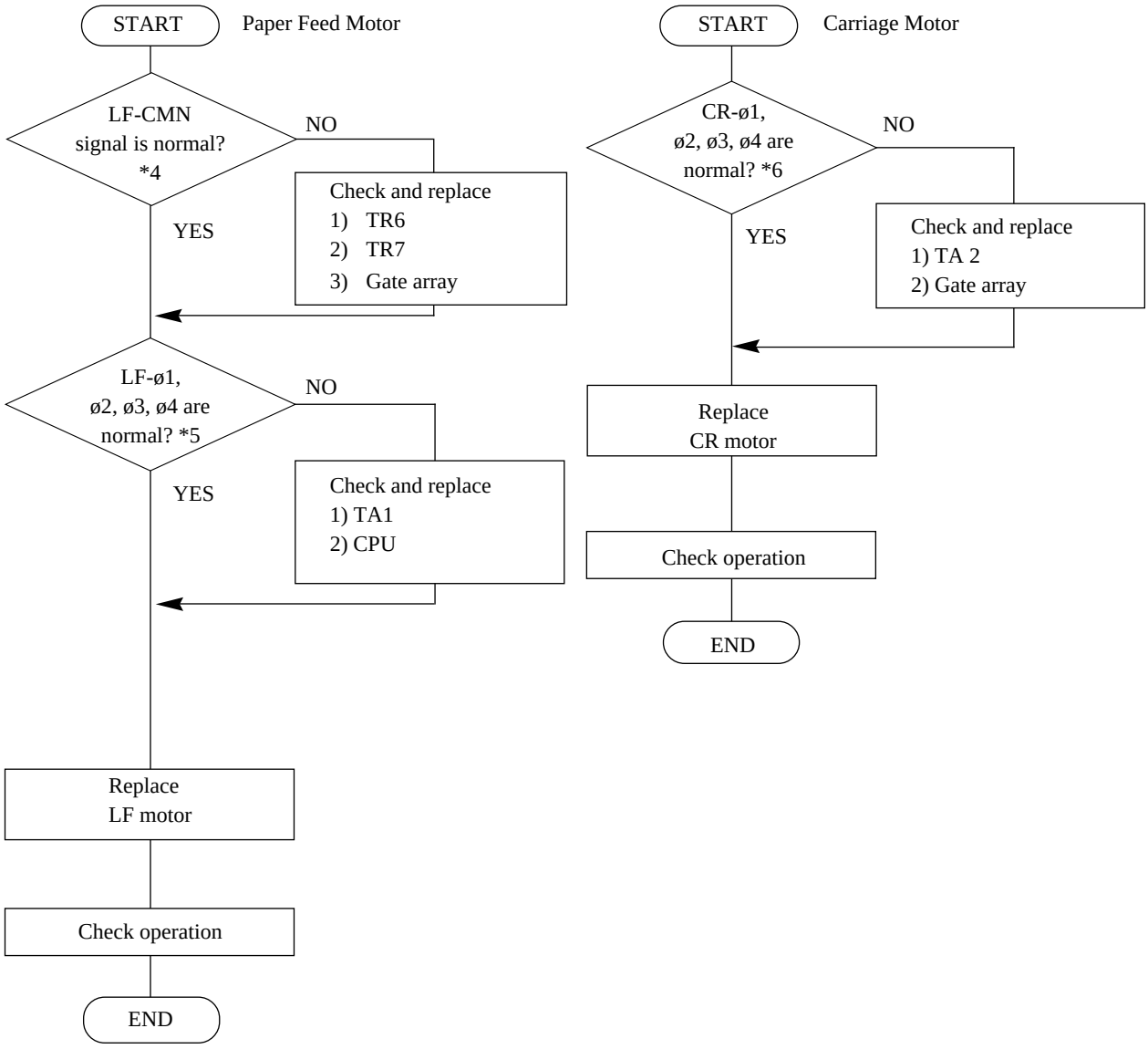
(1) Remove connector CN101 from power supply unit.



The no load voltages are below:

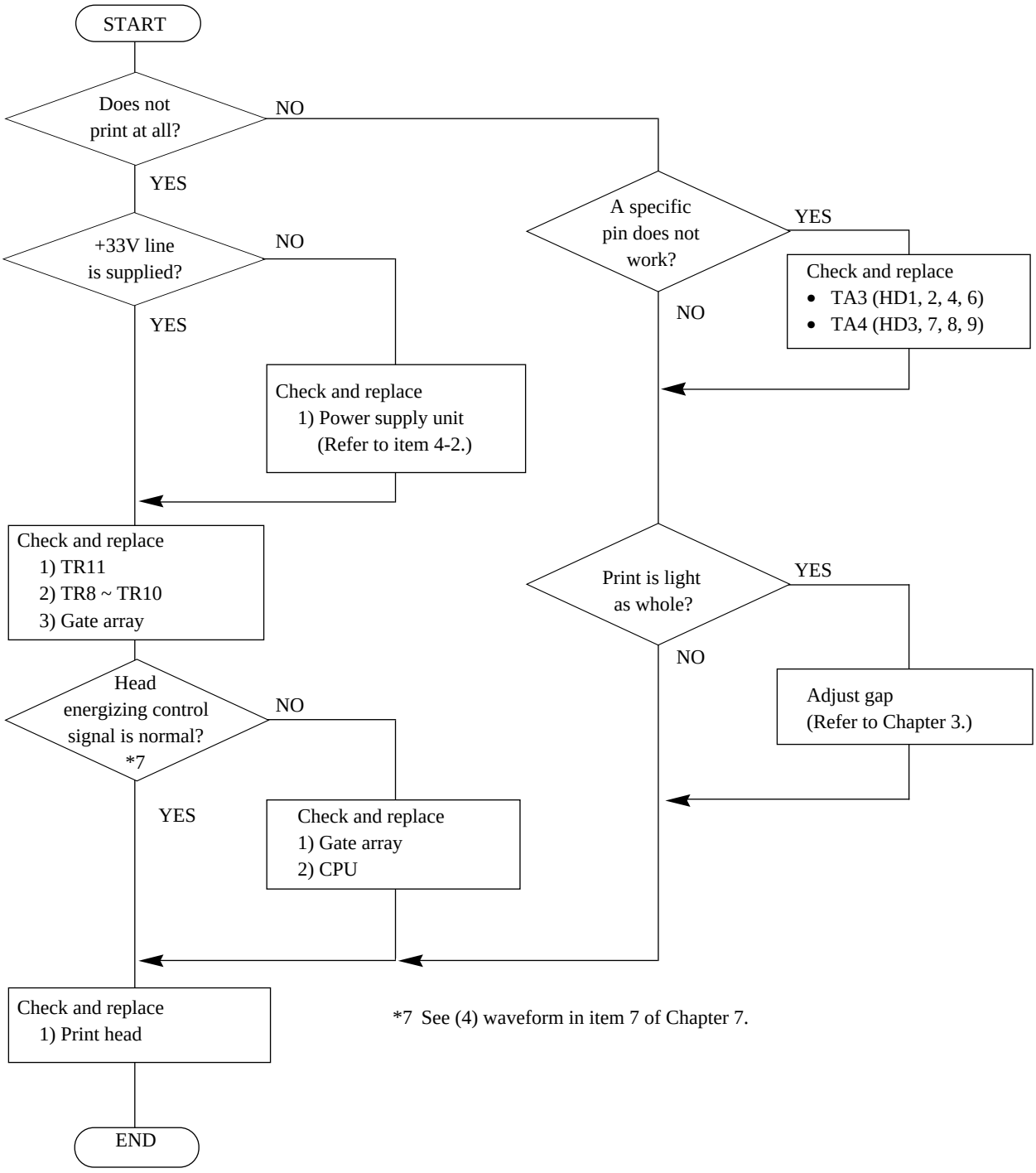
VH (33V) Line	+33V ± 5%	Between Pin 4 and Pin 3 of CN101
VL (5V) Line	+5V ± 5%	Between Pin 1 and Pin 2 of CN101

4-3. Defective Motor Operation



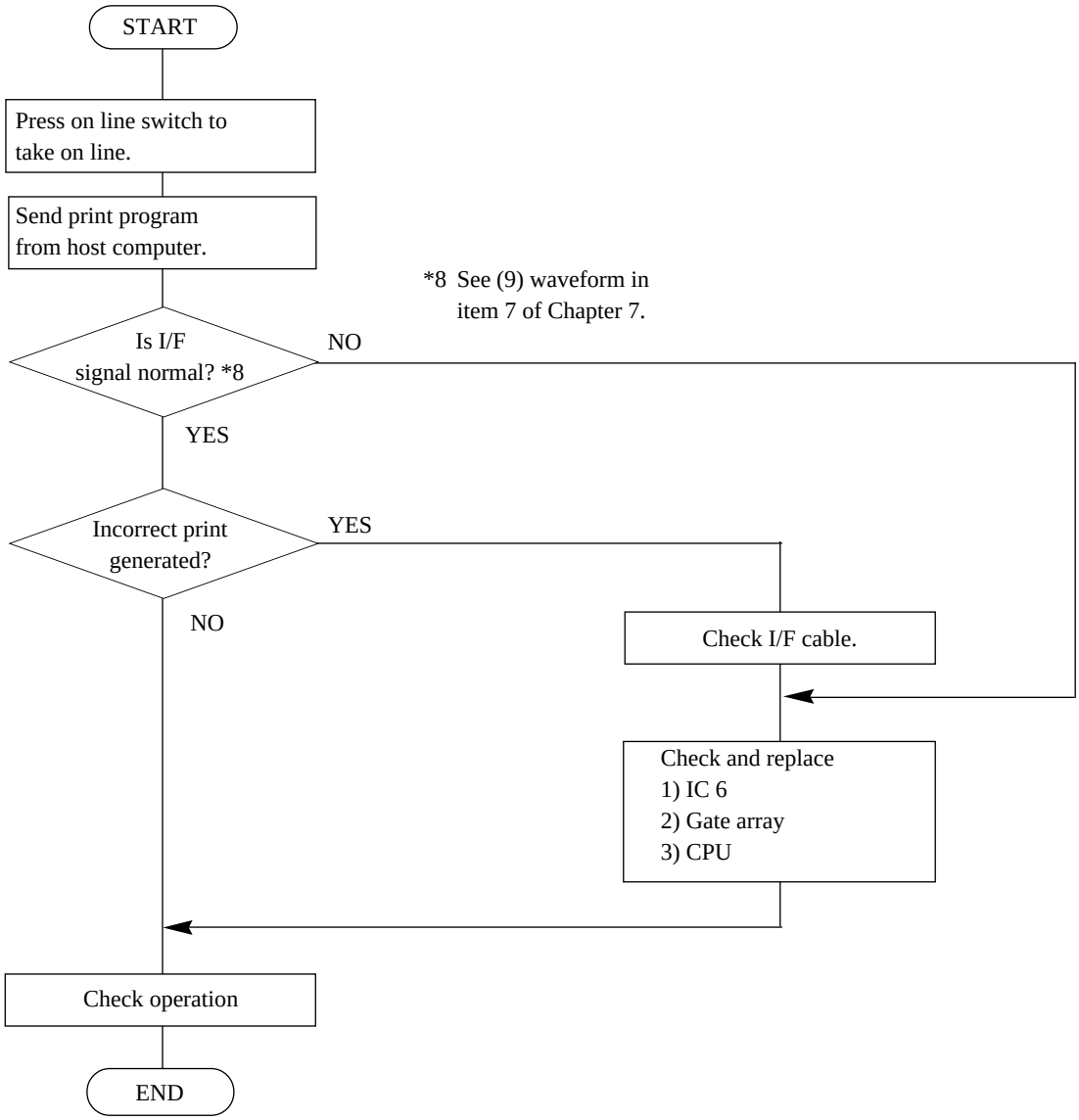
*4 See (7) waveform in item 7 of Chapter 7.
*5 See (8) waveform in item 7 of Chapter 7.
*6 See (6) waveform in item 7 of Chapter 7.

4-4. Defective Print Head Operation



*7 See (4) waveform in item 7 of Chapter 7.

4-5. Defective Interface Operation



CHAPTER 7
PARTS LIST

HOW TO USE PARTS LIST

(1) DRWG. NO.
This column shows the drawing number of the illustration.

(2) REVISED EDITION MARK
This column shows a revision number.
Part that have been added in the revised edition are indicated with "#".
Part that have been abolished in the revised edition are indicated with "*".
#1 : First edition → Second edition *1 : First edition → Second edition

(3) PARRTS NO.
Parts numbers must be notified when ordering replacement parts. Parts described as "NPN" have no parts number and are not in stock, i.e., unavailable.

(4) PARTS NAME
Parts names must be notified when ordering replacement parts.

(5) Q'TY
This column shows the number of the part used as indicated in the figure.

(6) REMARKS
When there are differences in the specifications of the fuse, destinations, etc., the differences are described in words or indicated by two letters.

US ..... U.S.A.	EC ..... EC(with Germany)	UK ..... United Kingdom	HK ..... Hong Kong
AS ..... Australia	LA ..... Latin America	SU ..... Russia	

(7) RANK
Parts marked "S" are service parts. Service parts are recommended to be in stock for maintenance.

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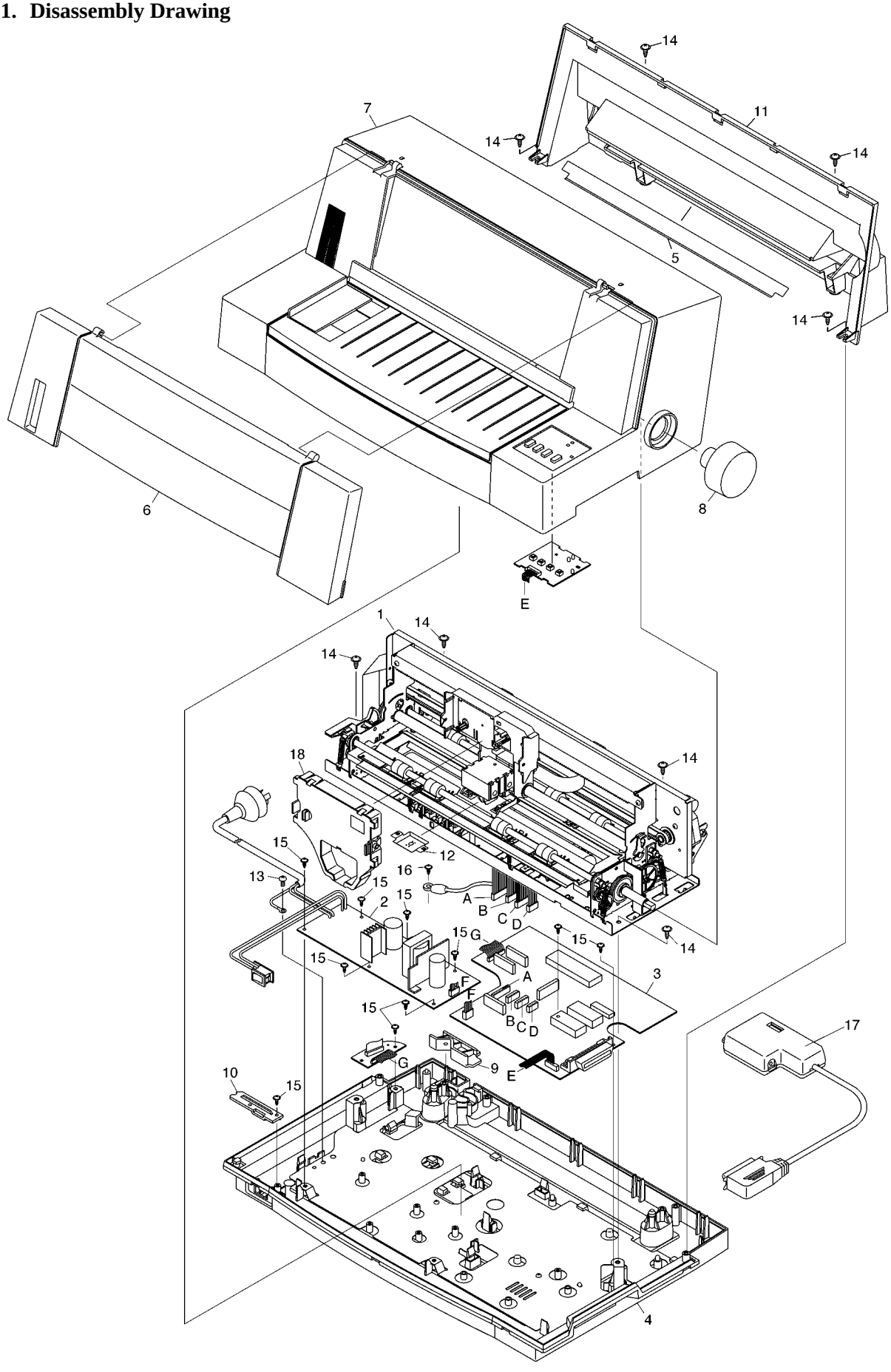
1. Printer Assembly

1-1. Disassembly Drawing



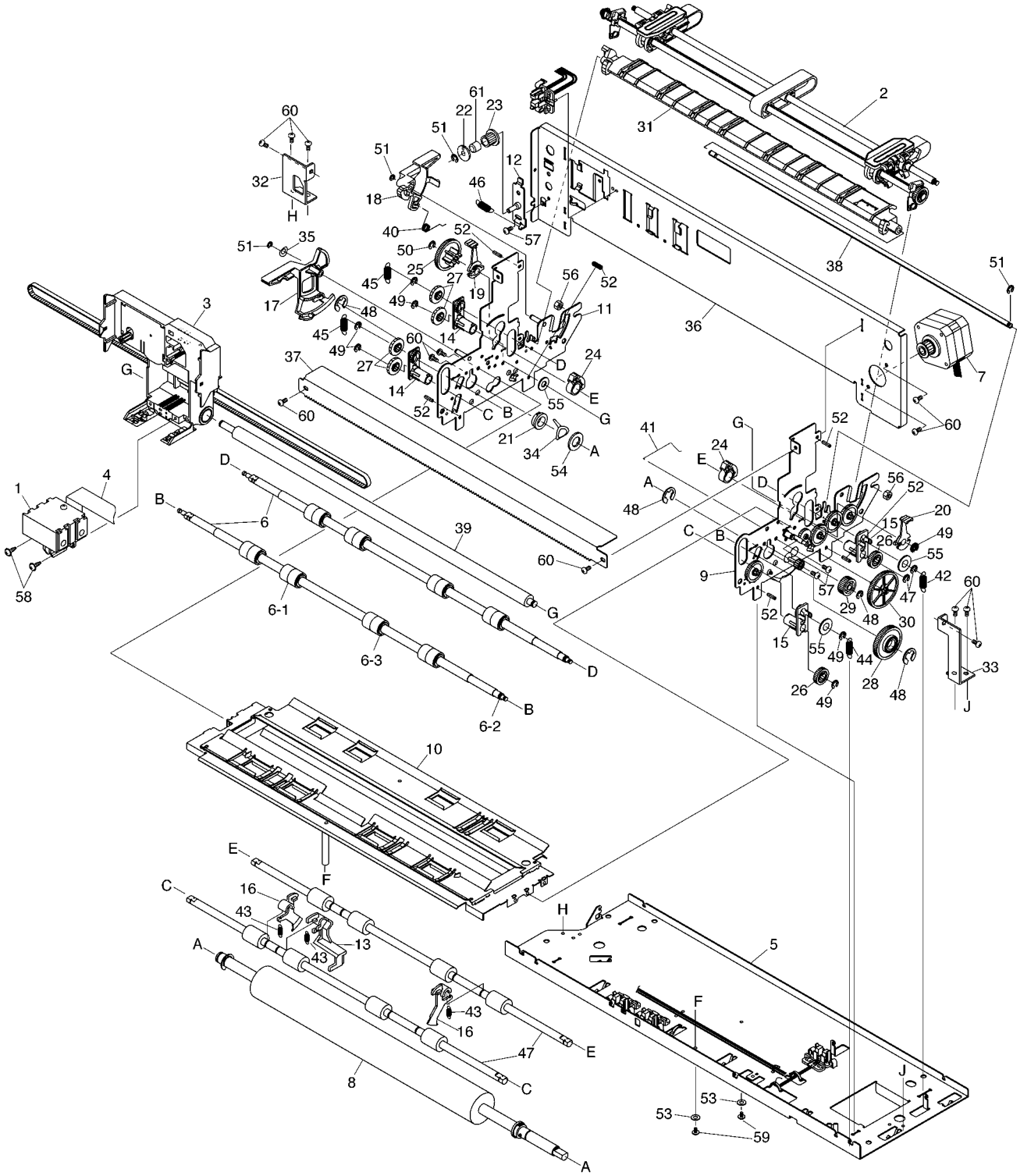
1-2. Parts List

Printer Assembly

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
1		89430050	MECHANISM WITH HEAD DP701E (D)	1		S
2		87814610	POWER SPLY BD UNIT HA-15 US(D)	1	FOR US	S
		87814620	POWER SPLY BD UNIT HA-15 EC(D)	1	FOR EC,LA,RU	S
		87814630	POWER SPLY BD UNIT HA-15 UK(D)	1	FOR UK	S
		87814640	POWER SPLY BD UNIT HA-15 AS(D)	1	FOR AS	S
		87814650	POWER SPLY BD UNIT HA-15 HK(D)	1	FOR HK	S
3	*2	87822080	MAIN LOGIC BD UNIT HF-12H(D)	1		S
	#2	87822081	MAIN LOGIC BD UNIT HF-12H	1	EXCEPT FOR RU	S
	#2	86822281	MAIN LOGIC BD UNIT HF-12H RU	1	FOR RU	S
4	*2	87821080	LOWER CASE UNIT HBF-12(D)	1		S
	#2	87821081	LOWER CASE UNIT HBF-12(D)	1		S
5	*2	87820640	SUB-GUIDE B ASSY HF-12(D)	1	INCLUDED DRWG.NO.11	S
	#2	80910461	SUB-GUIDE B WITH TAPE HF-12	1	INCLUDED DRWG.NO.11	S
6		87820180	PRINTER COVER UNIT HF-12H(D)	1		S
7		87820160	FRONT CASE UNIT HF-12H(D)	1		S
8		87816300	PLATEN KNOB UNIT QBF-10(D)	1		S
9		NPN	POWER CORD HOLDER HF-12	1		
10		NPN	SWITCH HOLDER HF-12	1		
11		87820450	REAR CASE ASSY HF-12(D)	1		S
12		82902600	RIBBON HOLDER 701C	1		S
13		01914036	SCREW TR 4-5 WS	1		S
14		01914031	SCREW TAT 4-12 PT-FL	8		S
15		01903038	SCREW TAT 3-10 PT-FL	10		S
16		00930803	SCREW TAT 3-8 PT	1		S
17		89595010	S-P CONVERTER SPC-8K UPC	1	FOR US,LA :OPTION	
		89595020	S-P CONVERTER SPC-8K JAN	1	EXCEPT FOR US,LA:OPT	
18		89510230	RIBBON CASSETTE JAN Z9HD	1	EXCEPT FOR US,LA	S
		89510240	RIBBON CASSETTE UPC Z9HD	1	FOR US,LA	S
		89510260	RIBBON CASSETTE JAN LZ9	1	EXCEPT FOR US,LA:OPT	
		89510270	RIBBON CASSETTE UPC LZ9	1	FOR US,LA :OPTION	

2. Printer Mechanism

2-1. Disassembly Drawing



2-2. Parts List

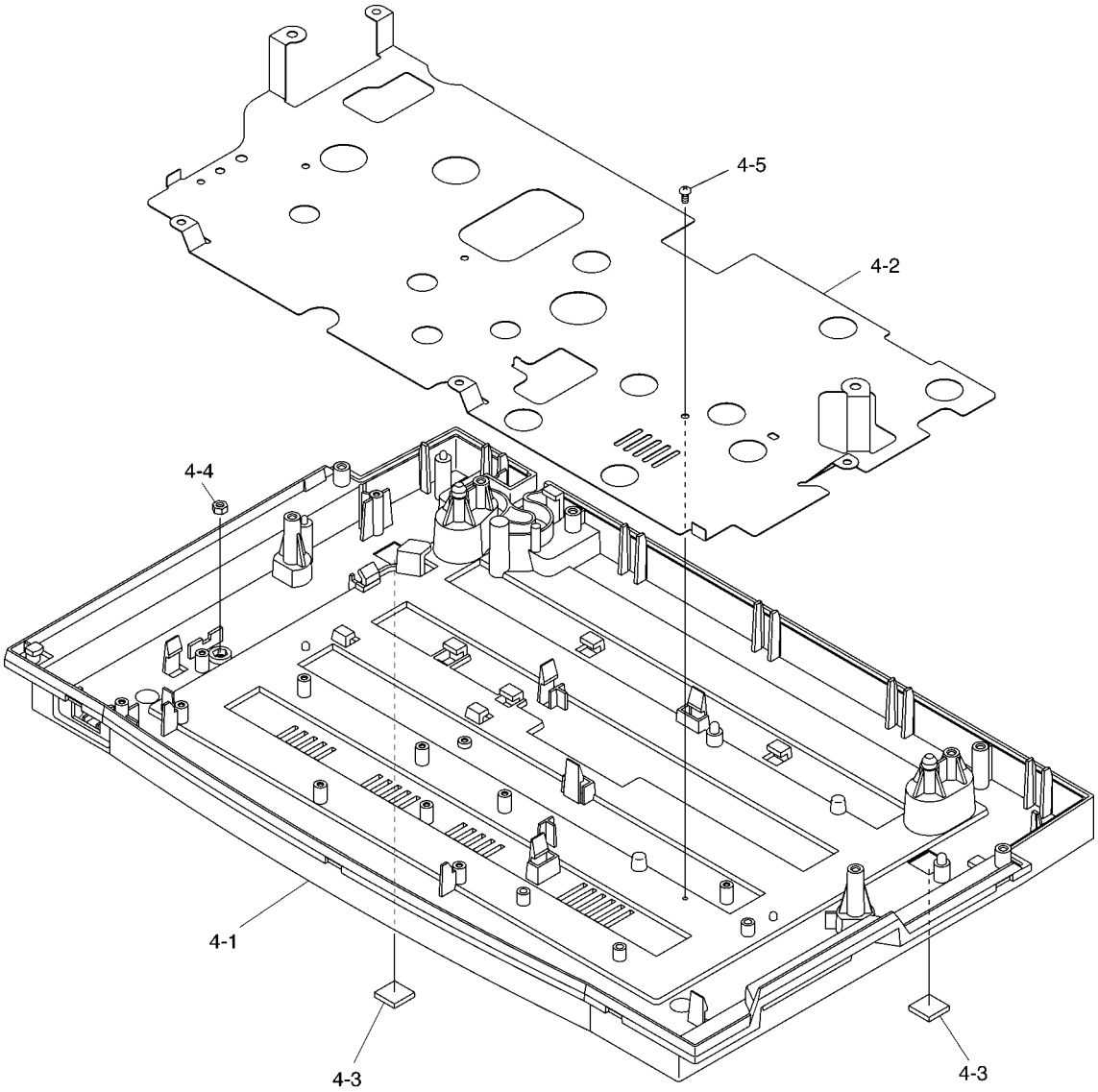
Printer Mechanism

DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
1	*2	89137060	PRINT HEAD DP7001E	(D)	1		S
	#2	89137061	PRINT HEAD DP7001E	(D)	1		S
2		86436010	TRACTOR UNIT	701C	1		
3	*2	86432010	CARRIAGE UNIT	701C	1		S
	#2	86432011	CARRIAGE UNIT	701C	1		S
4		86431310	HEAD CABLE ASSY	701C	1		S
5		NPN	FRAME BASE ASSY	791C	1		
6		86430420	PF ROLLER ASSY	701C	2		S
6-1		83200881	HOLDER ROLLER	102	8	INCLUDED DRWG.NO.6	
6-2		81361150	PF ROLLER SHAFT	701C	1	INCLUDED DRWG.NO.6	
6-3		04020014	STOP RING SE6.0		8	INCLUDED DRWG.NO.6	
7		86430390	CARRIAGE MOTOR ASSY	701C	1		S
8		86430350	PLATEN ASSY	701C	1		S
9		86430050	FRAME R UNIT	701E	1		
10		86430040	PAPER GUIDE UNIT	701C	1		S
11		86430020	FRAME L UNIT	701C	1		
12		86037381	TENSION LEVER ASSY	981	1		
13	*2	83904520	PICK-UP LEVER	791C	1		
	#2	83904521	PICK-UP LEVER	791C	1		
14		83904470	ROLLER HOLDER L	701C	2		
15		83904460	ROLLER HOLDER R	701C	2		
16	*2	83401341	PE DETECTOR LEVER	701C	2		
	#2	83401342	PE DETECTOR LEVER	701C	2		
17		83401331	ADJUSTING LEVER	701C	1		S
18		83401320	RELEASE LEVER	701C	1		S
19		83201100	ADJUSTING BUSHING L	701C	1		S
20		83201090	ADJUSTING BUSHING R	701C	1		S
21		83201080	BUSHING F10X14X5.5	701C	1		
22		83200222	PULLEY CAP	868	1		
23		83120570	TIMING PULLEY B	102	1		
24		83101910	RELEASE GEAR	701C	2		S
25		83101900	ADJUSTING GEAR	701C	1		S
26		83101890	GEAR 30X0.5	701C	2		S
27		83101880	GEAR 15X1	701C	4		S
28		83101820	PLATEN GEAR	721	1		S
29		83101240	GEAR 32X0.5	941	1		S
30		83100520	IDLER GEAR 16X72X0.5		1		S
31		83010090	PAPER PATH CHANGE PLATE	701C	1		
32		NPN	FRAME SUPPORT L	701C	1		
33		NPN	FRAME SUPPORT R	701C	1		
34		82210200	WAVE WASHER	701C	1		S
35		82210120	WAVE WASHER	905	1		S
36		NPN	FRAME HOLDER	701C	1		
37		82091610	REAR ANGLE	701C	1		
38		81361040	RELEASE SHAFT	701C	1		
39		NPN	CARRIAGE STAY	701C	1		
40		80531110	RELEASE LEVER SPRING	701C	1		S
41		80531090	GROUND SPRING	701C	1		
42		80511170	SPRING E050-035-0236-B		1		S
43		80511161	SPRING E040-018-0146		3		S
44		80510670	SPRING E040-023-0137		1		S
45		80510590	SPRING E050-040-0263		2		S
46		80510220	SPRING E050-060-0183		1		S
47		80201270	PAPER FEED ROLLER B	701C	2		S
48		04020018	STOP RING SE8.0		3		S
49		04020017	STOP RING SE5.0		9		S

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
50		04020016	STOP RING SE4.0	2		S
51		04020015	STOP RING SE3.0	4		S
52		04012501	ROLL PIN SP2.5X10	8		S
53		02440401	WAVE WASHER WW4X8X0.2X1.5H	2		S
54		02210001	PLAIN WASHER WF10X18X1.6	1		S
55		02206002	PLAIN WASHER WF6X13X1.0	3		S
56		02020401	HEXAGON NUT NH4-2	2		S
57		01903073	SCREW TR 3-6 FL SPECIAL	1		S
58		01903038	SCREW TAT 3-10 PT-FL	2		S
59		01903031	SCREW TR 3-6 FL	2		S
60		00630404	SCREW TR 3-4	14		S
61	#2	03870405	BEARING L-940ZZR	1		S

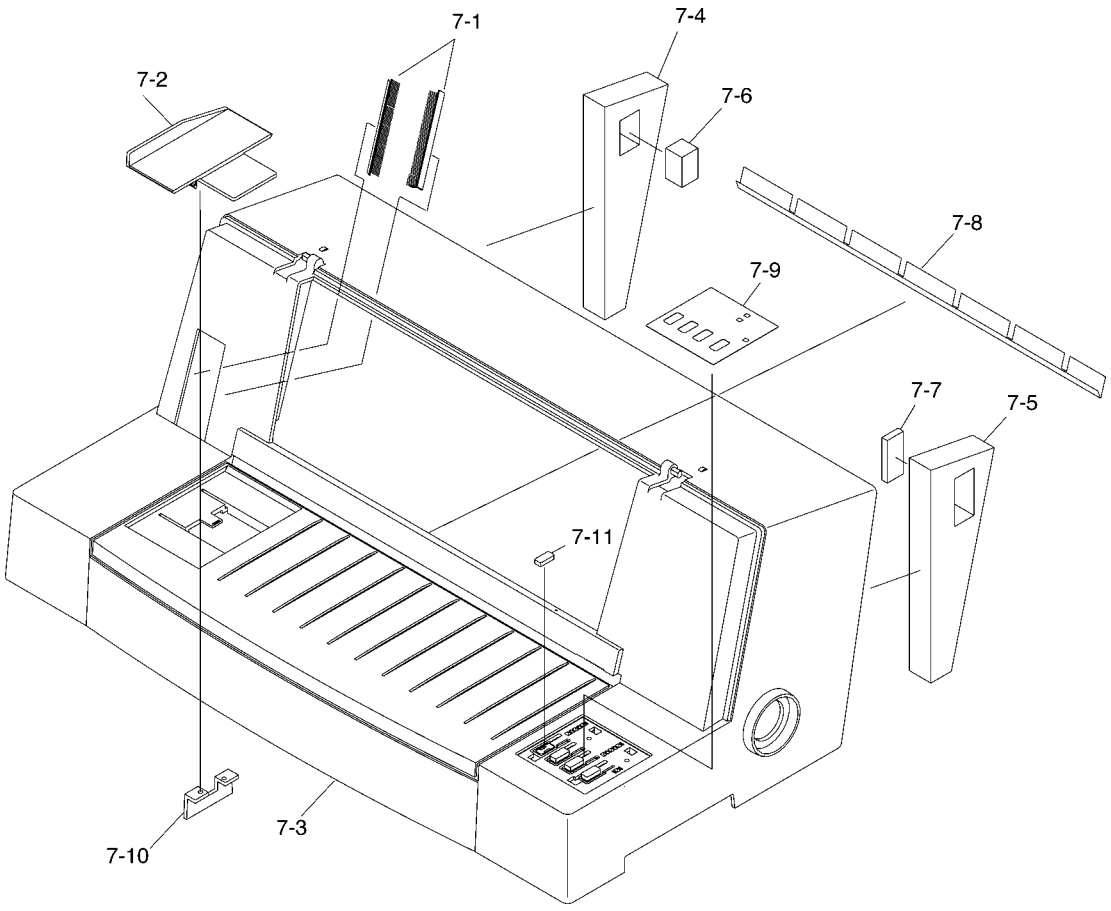
3. Sub - Assembly

3-1. Lower Case Unit

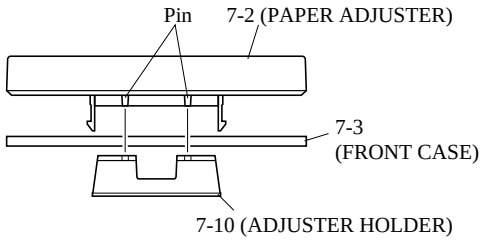


DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
4-1	*2	83026071	LOWER CASE	HF-12	1		S
	#2	83026072	LOWER CASE	HF-12	1		S
4-2		NPN	LOWER CASE CHASSIS	HF-12	1		
4-3		NPN	RUBBER FOOT 15X15	QBS-10	2		
4-4		02010401	HEXAGON NUT NH4-1		1		
4-5		00930803	SCREW TAT 3-8 PT		1		

3-2. Front Case Unit

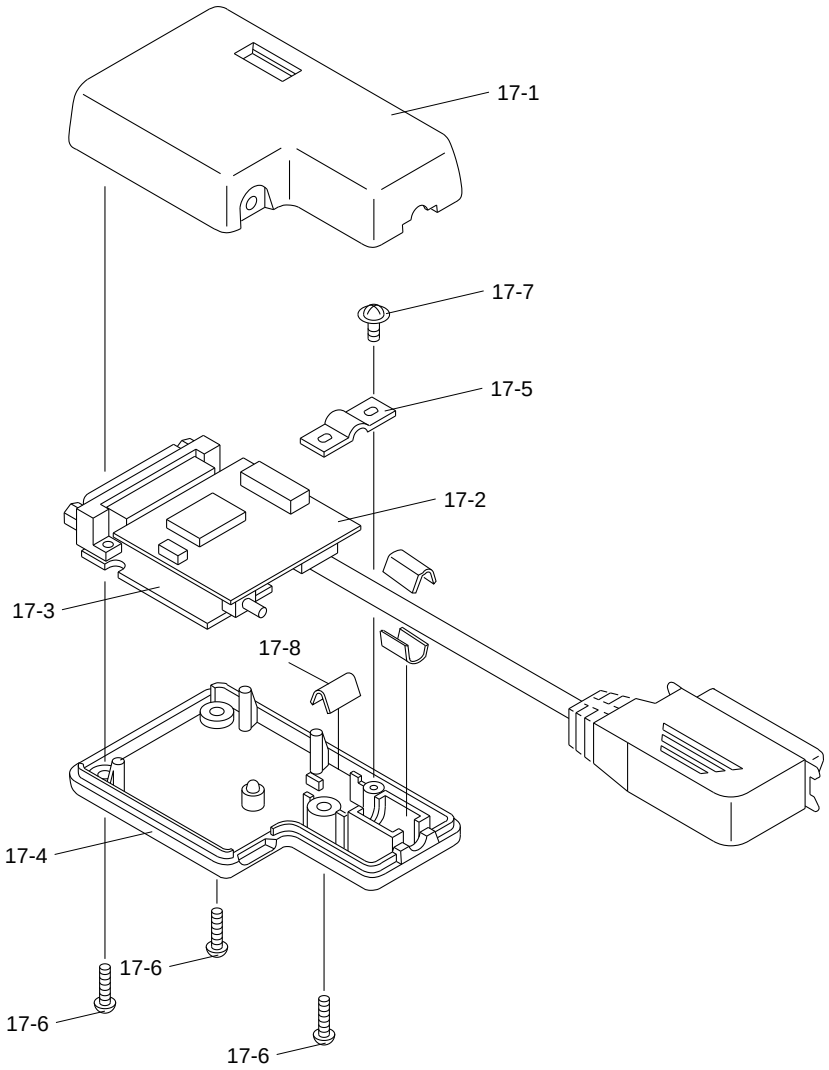


DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
7-1		87820430	BLIND BRUSH ASSY HF-12(D)	2		
7-2	*1	83904512	PAPER ADJUSTER HF-12	1	:NOTE1	
	#1	83904780	PAPER ADJUSTER HBF-12	1	:NOTE1	
7-3		83026062	FRONT CASE HF-12	1		S
7-4		NPN	SHEET 3 HF-12	1		
7-5		NPN	SHEET 2 HF-12	1		
7-6		NPN	RUBBER CUSHION B HF-12	1		
7-7		NPN	RUBBER CUSHION A HF-12	1		
7-8		80910451	SUB-GUIDE A HF-12	1		S
7-9		80088210	OPERATION SHEET HF-12H	1	EXCEPT FOR RU	
	*2	80088350	OPERATION SHEET HF-12H SU	1	FOR RU	
	#2	80088210	OPERATION SHEET HF-12H	1	FOR RU	
7-10		83904770	ADJUSTER HOLDER HF-12H	1	:NOTE1	
7-11		83912390	KEY-TOP HBF-12	1		



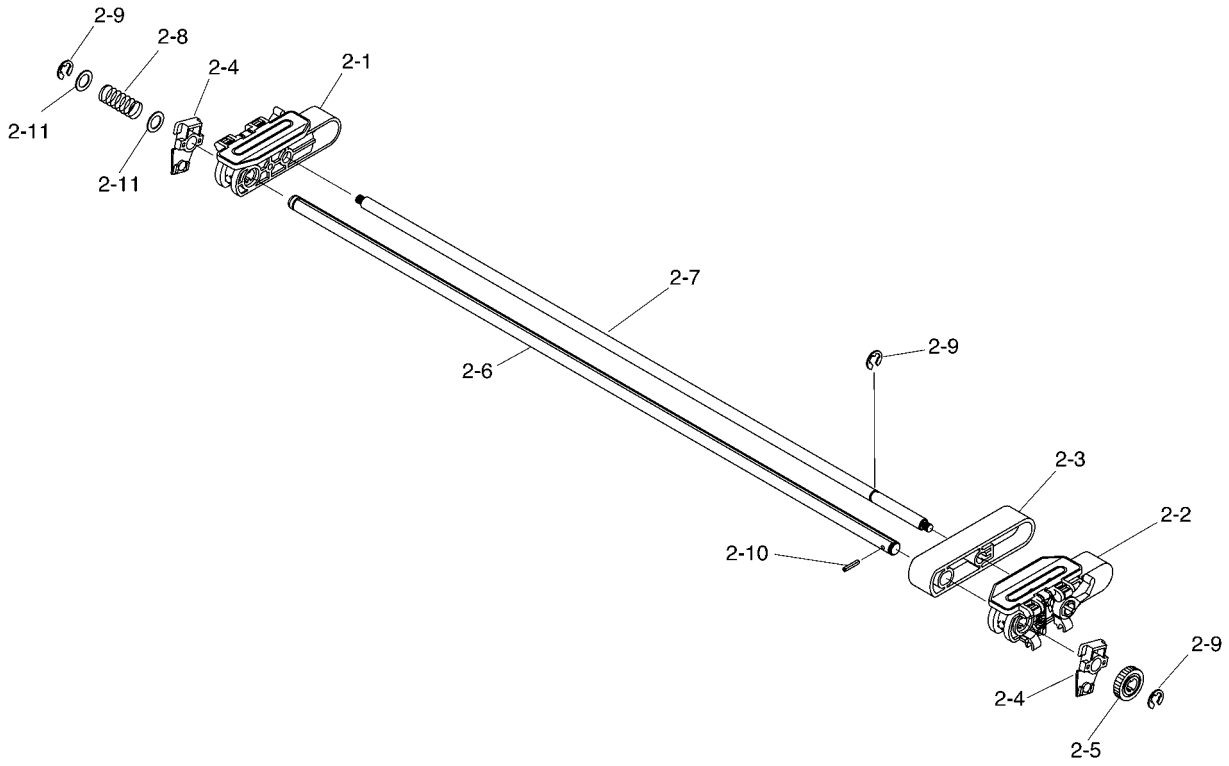
NOTE 1: An adjuster holder (7-10) has been installed in printers manufactured after the first lot. For installation, insert the pins on the paper adjuster into the holes in the adjuster holder, then use plastic adhesive to glue together the paper adjuster and adjuster holder.

3-3. Serial-Parallel Converter (Option)



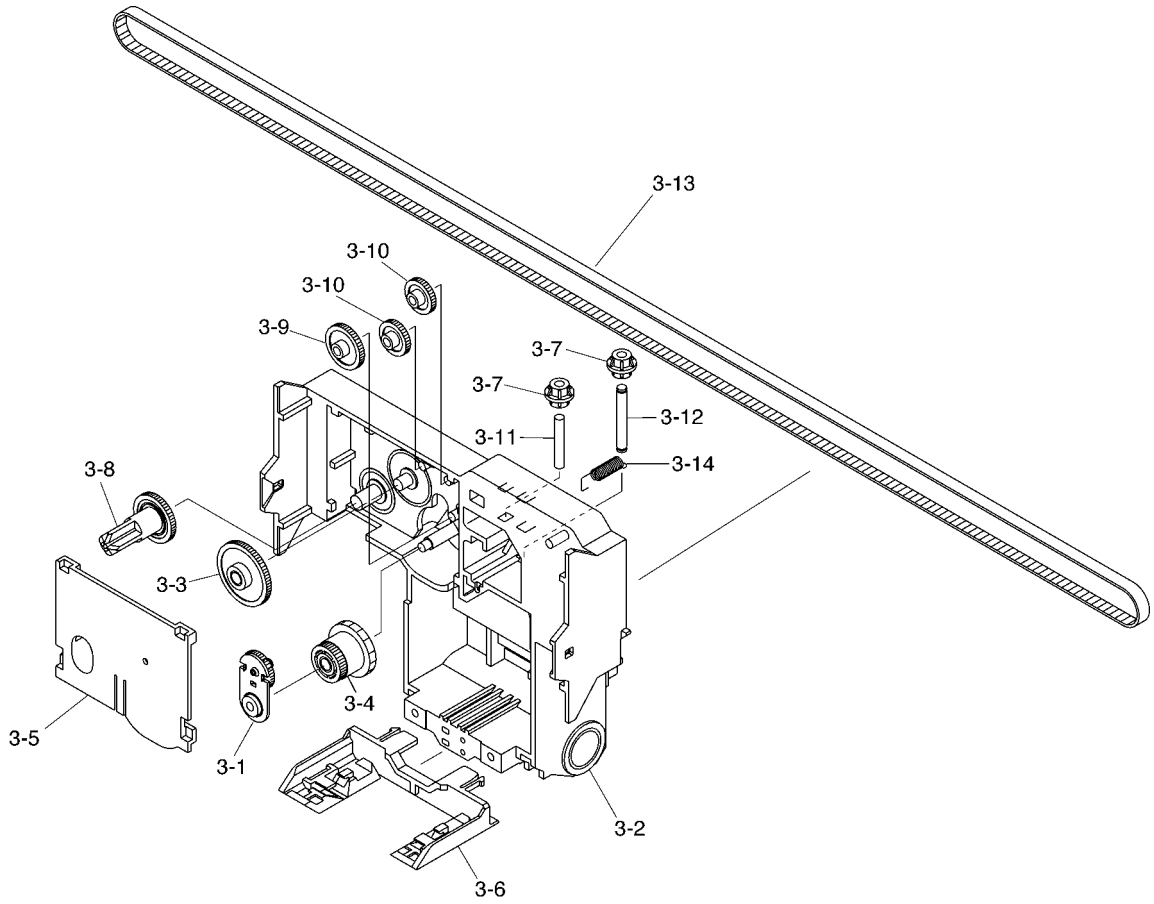
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
17-1		NPN	UPPER CASE SPC-8K	1		
17-2		NPN	CPU BOARD UNIT SPC-8K	1		
17-3		87590020	IF BOARD UNIT SPC-8K	1		
17-4		NPN	LOWER CASE UNIT SPC-8K	1		
17-5		NPN	CORD HOLDER SPC-8K	1		
17-6		NPN	SCREW TAT 3-12 PT-FL	3		
17-7		NPN	SCREW TAT 3-8 PT-FL	1		
17-8		NPN	CORD HOLDER PLATE SPC-8K	1		
-		NPN	FERRITE CORE HF70RU12X5	2		

3-4. Tractor Unit



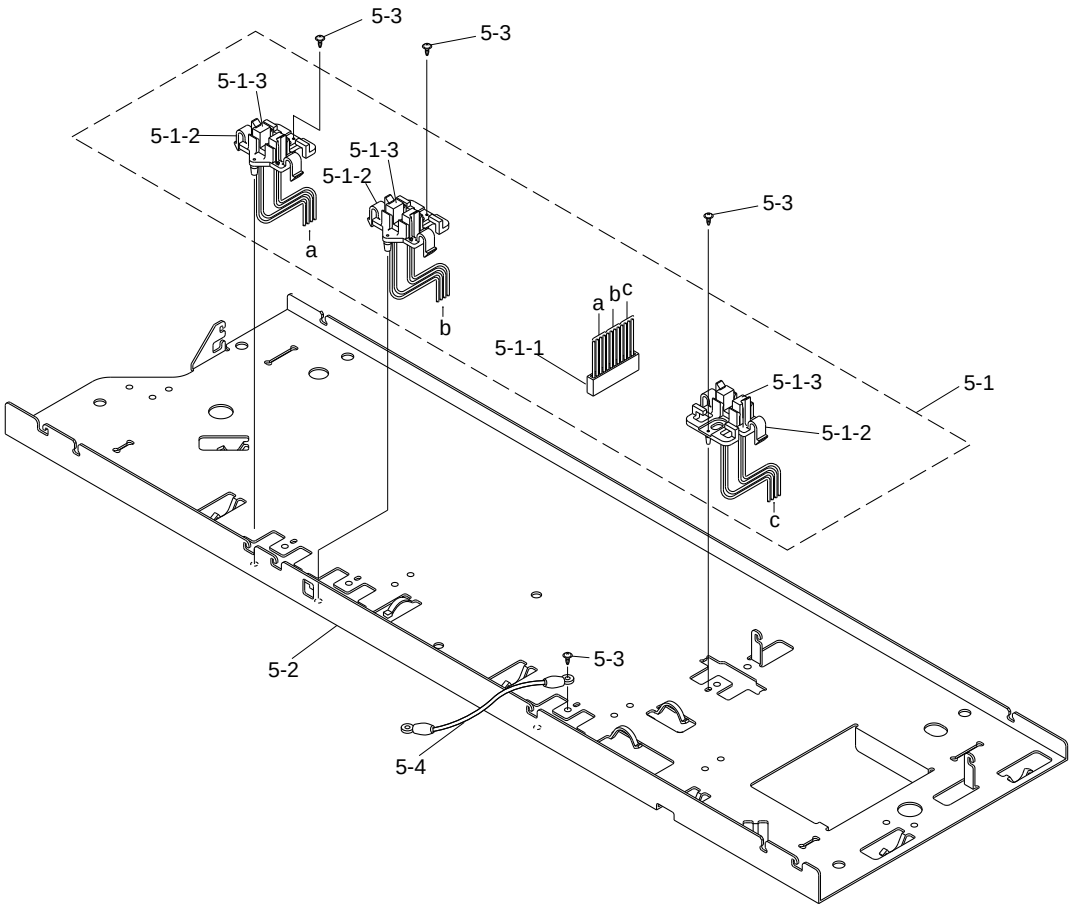
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
2-1		86436330	TRACTOR L ASSY 701C	1		S
2-2		86436320	TRACTOR R ASSY 701C	1		S
2-3		NPN	SHEET GUIDE 701C	1		
2-4		83200651	TRACTOR BUSHING 891	2		S
2-5		83101690	TRACTOR GEAR 771	1		S
2-6		NPN	TRACTOR SHAFT 701C	1		
2-7		NPN	TRACTOR STAY 701C	1		
2-8		80521090	SPRING C090-060-0179	1		
2-9		04020017	STOP RING SE5.0	3		
2-10		04012002	ROLL PIN SP2.0X10	1		
2-11		02307050	POLY-SLIDER WP7X0.5	2		

3-5. Carriage Unit



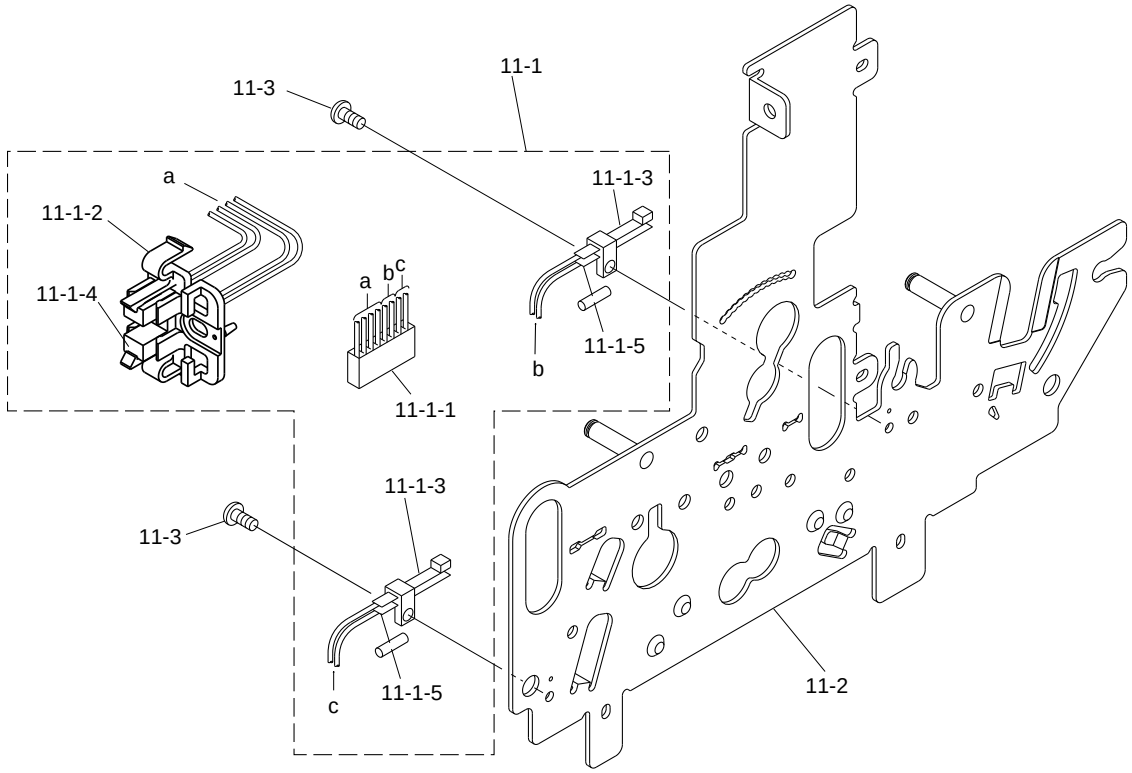
DRWG.NO.	REV.	PARTS NO.	PARTS NAME		Q'TY	REMARKS	RANK
3-1		86432320	CLUTCH PLATE UNIT	701C	1		S
3-2	*2	86432310	CARRIAGE ASSY	701C	1		
	#2	86432311	CARRIAGE ASSY	701C	1		
3-3		86060810	IDLER ASSY	921	1		
3-4		86032411	GEAR A ASSY	981	1		
3-5		83912331	GEAR COVER	701C	1		
3-6		83904490	CARD HOLDER	701C	1		
3-7		83200990	REAR ROLLER	981	2		S
3-8		83120470	RIBBON CASSETTE GEAR	921	1		S
3-9		83101370	GEAR 48X0.3	965	1		S
3-10		83100721	RF IDLER GEAR 37X0.3	905	2		S
3-11		NPN	ROLLER SHAFT	981	1		
3-12		NPN	ROLLER SHAFT	965	1		
3-13		80902220	TIMING BELT HTD102 446X4.8		1		
3-14		80511150	SPRING E035-029-0171		1		

3-6. Frame Base Assy



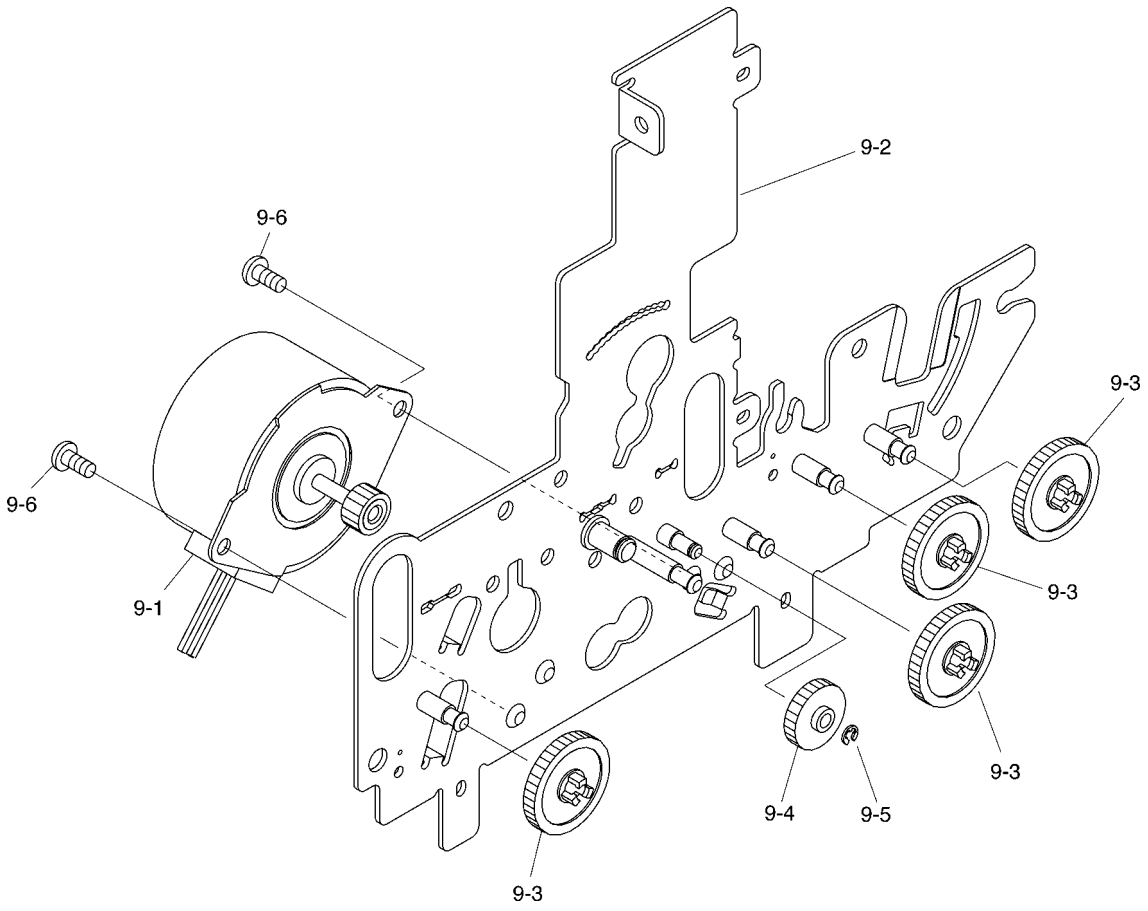
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
5-1	#2	86430630	DETECTOR A UNIT 791C	1		S
5-1-1	*2	87770280	CABLE ASSY A 791C(D)	1		S
	#2	80705710	CABLE UNIT A 791C	1		
5-1-2		83904500	DETECTOR HOLDER 701C	3		
5-1-3		08300152	PHOTO-INTERRUPTER RPI-574	3		S
5-2		NPN	FRAME BASE 701C	1		
5-3		01903064	SCREW TAT 3-5 CT	4		
5-4		NPN	WIRE 18UL1007BLK125TT	1		

3-7. Frame L Unit



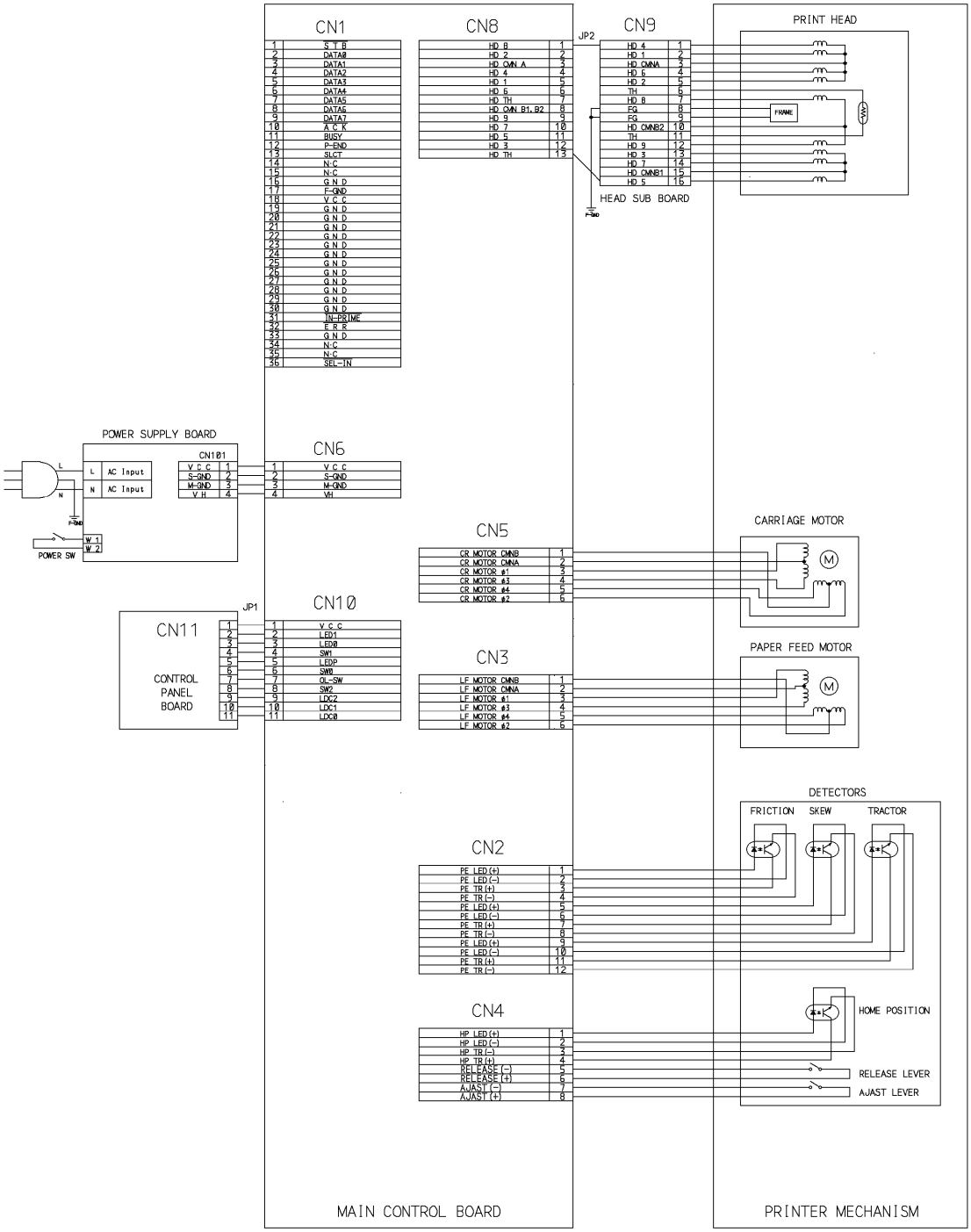
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
11-1	#2	86430620	DETECTOR B UNIT 701C	1		S
11-1-1	*2	87770210	CABLE ASSY B 701C(D)	1		S
	#2	80705650	CABLE UNIT B 701C	1		S
11-1-2		83904500	DETECTOR HOLDER 701C	1		
11-1-3		09090039	LEAF SWITCH LSA1119H	2		S
11-1-4		08300152	PHOTO-INTERRUPTER RPI-574	1		S
11-1-5		NPN	HEAT-SHRINK TUBE F2-2.0	4		
11-2		NPN	FRAME L ASSY 701C	1		
11-3		00926603	SCREW TAT 2.6-6 CT	2		

3-8. Frame R Unit



DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
9-1		86430440	PAPER FEED MOTOR ASSY 791C	1		S
9-2		NPN	FRAME R ASSY 701C	1		
9-3		83100510	GEAR 40X0.5	4		S
9-4		83100110	GEAR 26X0.5	1		S
9-5		04020010	STOP RING SE2.0	1		
9-6		01903064	SCREW TAT 3-5 CT	2		

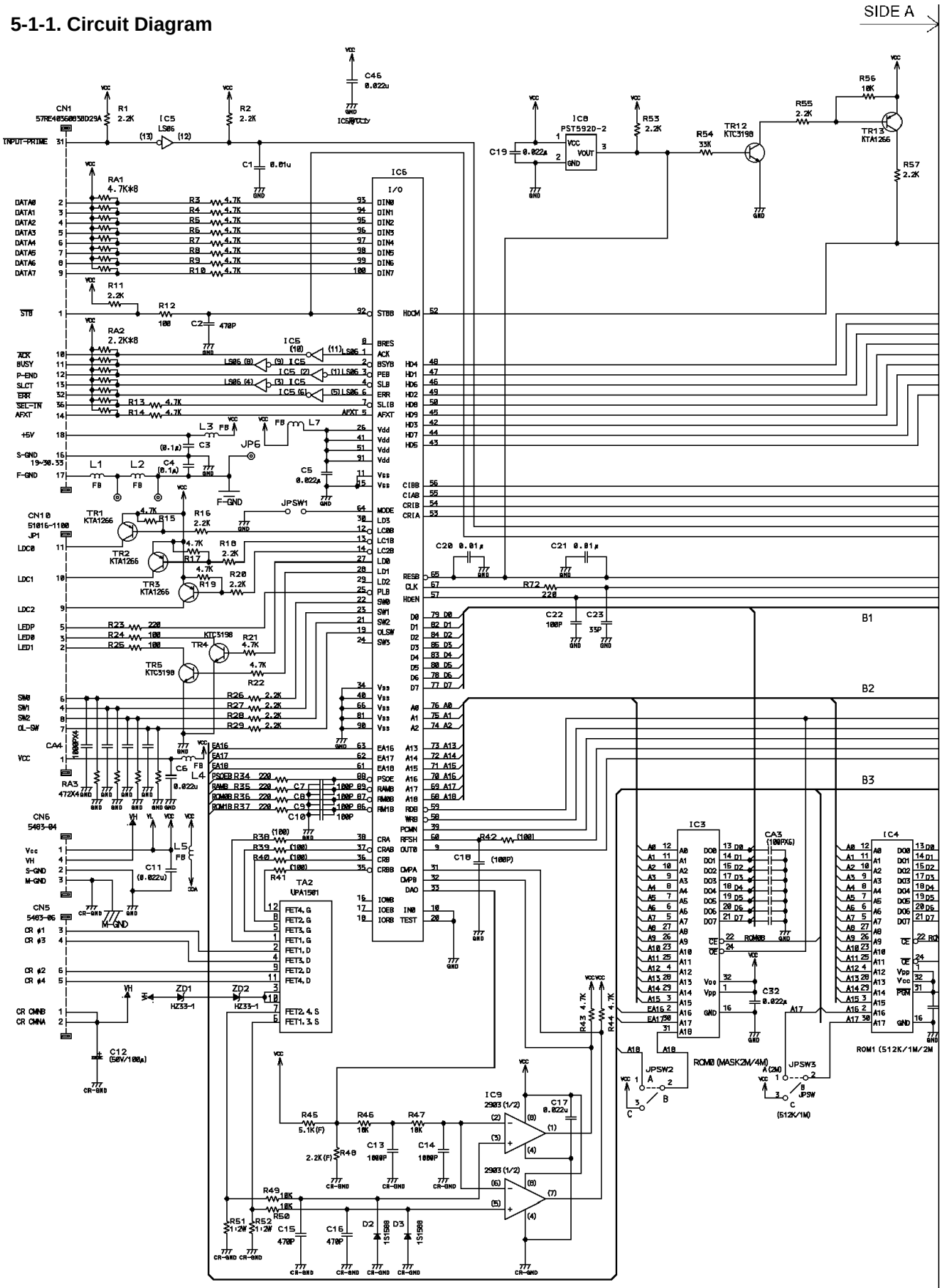
4. Wiring Scheme of Printer

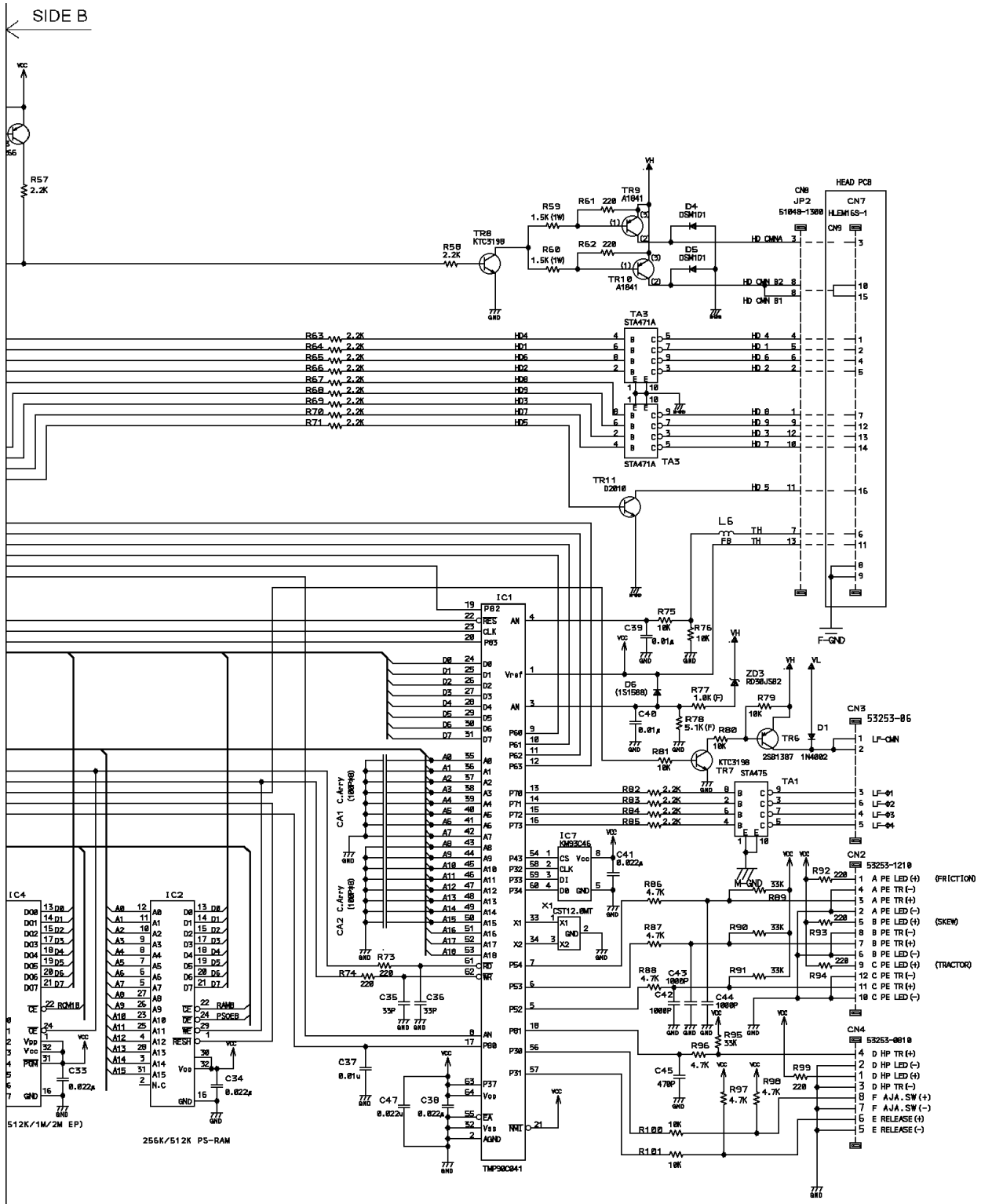


5. Electrical Parts

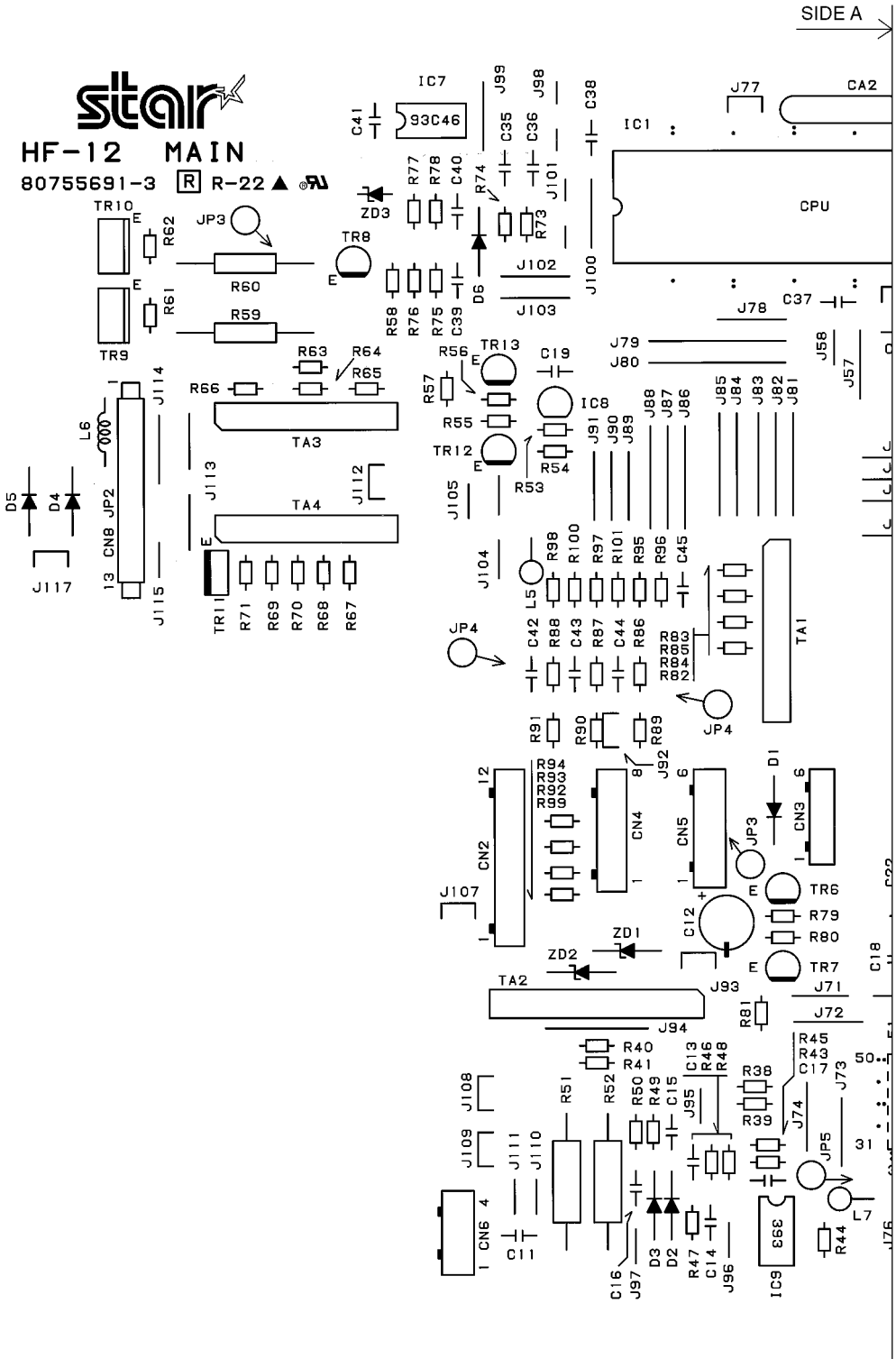
5-1. Main Logic Board

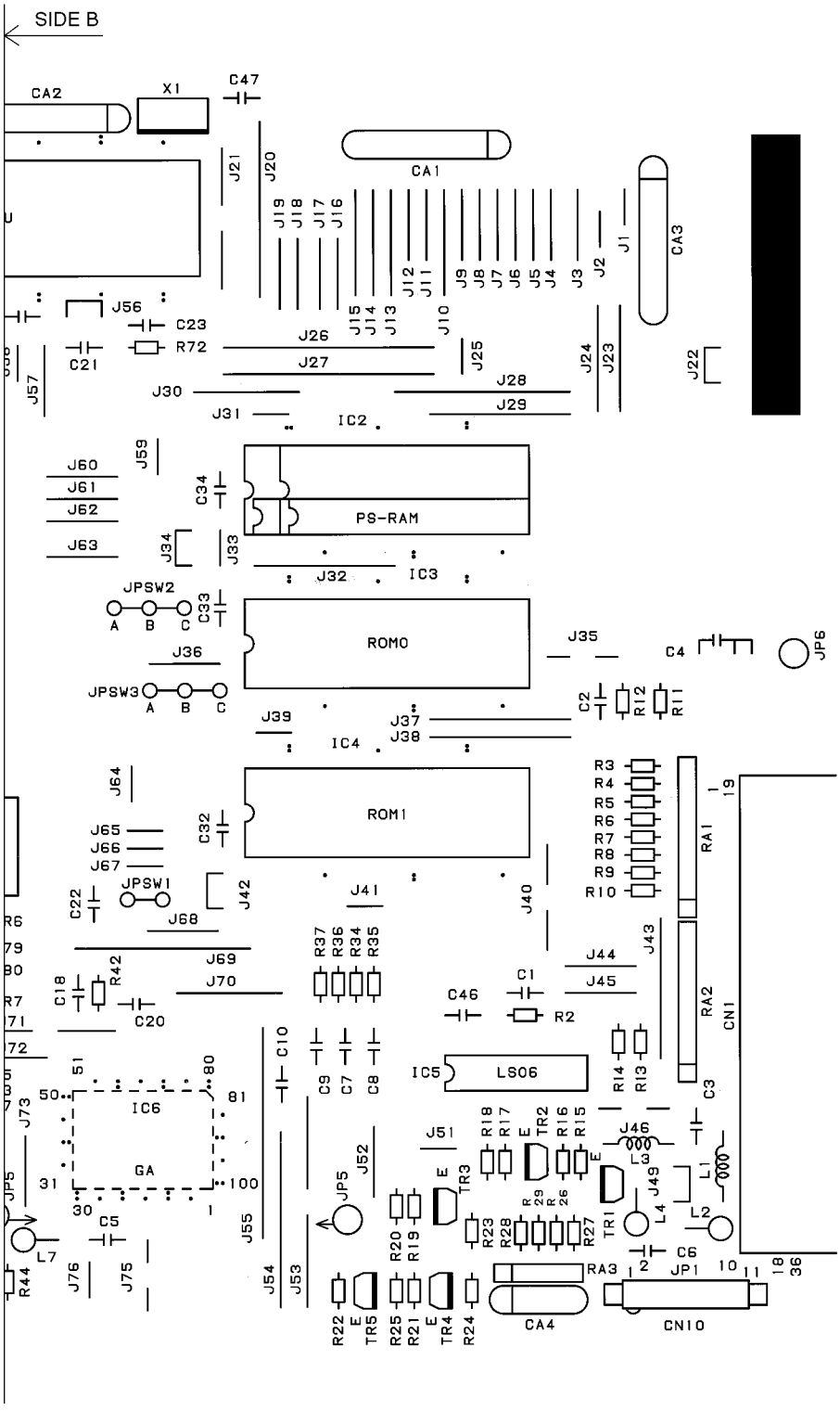
5-1-1. Circuit Diagram




SIDE B
HEAD PCB
CN8
JP2
51048-1300
CN7
HLEM16S-1
CN9
TR9
A1041
TR10
A1841
TR8
KTC3198
D4
DSM1D1
D5
DSM1D1
R57
2.2K
R58
2.2K
R59
1.5K(1W)
R60
1.5K(1W)
R61 220
R62 220
HD CMN A
HD CMN B2
HD CMN B1
TA3
STA471A
R63 2.2K
R64 2.2K
R65 2.2K
R66 2.2K
R67 2.2K
R68 2.2K
R69 2.2K
R70 2.2K
R71 2.2K
HD4
HD1
HD6
HD2
HD8
HD9
HD3
HD7
HD5
HD 4
HD 1
HD 6
HD 2
HD 8
HD 9
HD 3
HD 7
TR11
D2010
HD 5
L6
TH
FB
F-GND
IC1
P82
RES
CLK
P83
Vref
AN
P60
P61
P62
P63
P70
P71
P72
P73
P43
P32
P33
P34
P54
P53
P52
P51
P50
P37
P31
P00
NMI
AGND
Vss
TMP90C841
R75
10K
R76
10K
C39
0.01μ
D6
(1S1588)
R77
1.8K(F)
R78
5.1K(F)
C40
0.01μ
ZD3
RD30JUS82
R79
10K
R80
10K
R81
10K
TR6
2SB1387
D1
1N4002
TR7
KTC3198
CN3
53253-06
LF-CMN
TA1
STA475
R82 2.2K
R83 2.2K
R84 2.2K
R85 2.2K
LF-01
LF-02
LF-03
LF-04
IC7
KM93C45
CS
CLK
DI
DO
Vcc
GND
C41
0.022μ
X1
CST12.0MT
CA1 C.Arry
(100P×8)
CA2 C.Arry
(100P×8)
R73
220
R74
220
C35
33P
C36
33P
C37
0.01μ
C47
0.022μ
C38
0.022μ
R86
4.7K
R87
4.7K
R88
4.7K
C43
1000P
C42
1000P
C44
1000P
R89
33K
R90
33K
R91
33K
R92
220
R93
220
R94
220
R95
33K
R96
4.7K
R97
4.7K
R98
4.7K
C45
470P
R100
10K
R101
10K
CN2
53253-1210
A PE LED (+)
A PE TR (-)
A PE TR (+)
A PE LED (-)
B PE LED (+)
B PE TR (-)
B PE TR (+)
B PE LED (-)
C PE LED (+)
C PE TR (-)
C PE TR (+)
C PE LED (-)
(FRICTION)
(SKEW)
(TRACTOR)
CN4
53253-0810
D HP TR (+)
D HP LED (-)
D HP LED (+)
D HP TR (-)
F AJA.SW (+)
F AJA.SW (-)
E RELEASE (+)
E RELEASE (-)
IC4
512K/1M/2M EP)
IC2
256K/512K PS-RAM
C33
0.022μ
C34
0.022μ
ROM1B
RAMB
PSOEB
Vpp
Vcc
PGM
Vss
N.C
Vee
VH
VL
VCC
GND
M-GND
AGND

5-1-2. Component Layout




SIDE B
CA2
X1
C47
CA1
J21
J20
J19
J18
J17
J16
J15
J14
J13
J12
J11
J10
J9
J8
J7
J6
J5
J4
J3
J2
J1
CA3
J56
C23
R72
C21
J57
J26
J27
J25
J24
J23
J22
J30
J28
J31
J29
IC2
J60
J61
J62
J63
J59
C34
PS-RAM
J34
J33
J32
IC3
JPSW2
A B C
C33
ROM0
J35
C4
JP6
J36
JPSW3
A B C
C2
R12
R11
J39
J37
J38
IC4
J64
ROM1
J65
J66
J67
C32
JPSW1
J42
J41
J40
C22
J68
J69
J70
R3
R4
R5
R6
R7
R8
R9
R10
RA1
1
19
R37
R36
R34
R35
J44
J45
J43
C18
R42
C20
C46
C1
R2
RA2
CN1
R14
R13
C3
IC5
LS06
C10
C9
C7
C8
IC6
GA
J73
J51
R18
R17
TR2
R16
R15
J46
J52
TR3
J49
L1
L4
L2
TR1
C5
L7
R44
J76
J75
J55
J54
J53
JP5
R20
R19
R23
R28
R27
C6
JP1
RA3
CA4
CN10
R22
TR5
R25
R21
TR4
R24
10
11
18
36

5-1-3. Parts List

Main Logic Board

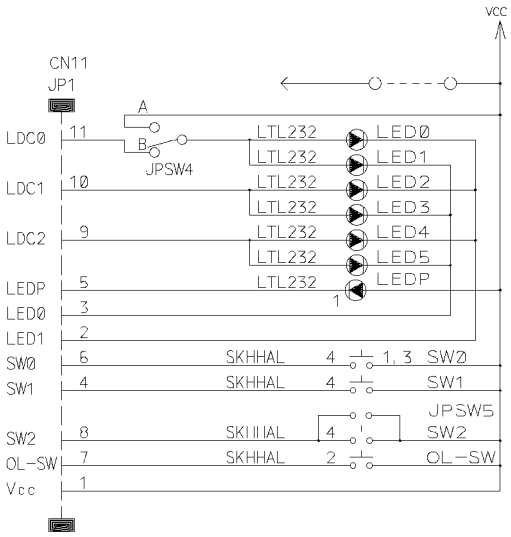
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250007	CPU TMP90C041	1		S
IC2		08221044	PSRAM HM65256BLSP-10ONS	1		S
IC3	*2	08223300	MASKED ROM 1.0 HF-12H	1		S
	#2	08223271	MASKED ROM 2.0 HA-15	1		S
	*2	NPN	IC SOCKET ICS-32-2T	1		
IC4	*2	08222017	EPROM D27C1001D-15ONS	1		S
	#2	08220116	EPROM 27512-15ONS	1	HF12 H *.*	S
		NPN	IC SOCKET ICS-32-2T	1		
IC5		08210103	TTL IC 74LS06	1		S
IC6		08240081	GATE ARRAY D65626GF-H09W1	1		S
IC7		08222047	EEPROM KM93C46	1		S
IC8		08200142	IC-RESET PST592D-2*	1		S
IC9		08200091	IC-LIN NJM2903D	1		S
D1	*1	08000087	DIODE 1N4002	1		S
	#1	08000084	DIODE 1N4002	1		S
D2-3	*2	08000039	DIODE 1S1588	2		
	#2	08000096	DIODE 1S2076A*A	2		
D4-5		08000040	DIODE DSM1D1	2		
D6					NOT MOUNTED	
ZD1-2		08020130	ZENER DIODE HZ33-1	2		
ZD3		08020099	ZENER DIODE RD30JSB2	1		
TA1		07650052	TRANSISTOR ARRAY STA475A	1		
TA2		08043001	FET ARRAY UPA1501H	1		
TA3-4		07650056	TRANSISTOR ARRAY UPA1428AH	2		
TR1-3		07011752	TRANSISTOR 2SA1266*	3		
TR4-5	*2	07601002	TRANSISTOR 2SC3198GR*	2		
	#2	07601004	TRANSISTOR 2SC3199GR*	2		
TR6		07113871	TRANSISTOR 2SB1387TZ	1		
TR7-8	*2	07601002	TRANSISTOR 2SC3198GR*	2		
	#2	07601004	TRANSISTOR 2SC3199GR*	2		
TR9-10		07018411	TRANSISTOR 2SA1841	2		
TR11		07320101	TRANSISTOR 2SD2010	1		
TR12	*2	07601002	TRANSISTOR 2SC3198GR*	1		
	#2	07601004	TRANSISTOR 2SC3199GR*	1		
TR13		07011752	TRANSISTOR 2SA1266*	1		
C1		NPN	CERA. CAPA. 0.01UF 50V	1		
C2		NPN	CERA. CAPA. 470PF 50V	1		
C3					NOT MOUNTED	
C4		NPN	CERA. CAPA. 0.01UF 250V	1		
C5-6		NPN	CERA. CAPA. 0.022UF 50V	2		
C7-10		NPN	CERA. CAPA. 100PF 50V	4		
C11-12					NOT MOUNTED	
C13-14		NPN	CERA. CAPA. 1000PF 50V	2		
C15-16		NPN	CERA. CAPA. 470PF 50V	2		
C17		NPN	CERA. CAPA. 0.022UF 50V	1		
C18					NOT MOUNTED	
C19		NPN	CERA. CAPA. 0.022UF 50V	1		
C20-21		NPN	CERA. CAPA. 0.01UF 50V	2		
C22		NPN	CERA. CAPA. 100PF 50V	1		
C23		NPN	CERA. CAPA. 33PF 50V	1		
C24-31					NOT USED	
C32-34		NPN	CERA. CAPA. 0.022UF 50V	3		
C35-36		NPN	CERA. CAPA. 33PF 50V	2		
C37		NPN	CERA. CAPA. 0.01UF 50V	1		
C38		NPN	CERA. CAPA. 0.022UF 50V	1		
C39-40		NPN	CERA. CAPA. 0.01UF 50V	2		

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
C41		NPN	CERA. CAPA. 0.022UF 50V	1		
C42-44		NPN	CERA. CAPA. 1000PF 50V	3		
C45		NPN	CERA. CAPA. 470PF 50V	1		
C46					NOT MOUNTED	
C47		NPN	CERA. CAPA. 0.022UF 50V	1		
CA1-3		NPN	CAPA. ARRAY 100PF 50V 8EL	3		
CA4		NPN	CAPA. ARRAY 1000PF 50V 4EL	1		
R1					NOT USED	
R2		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R3-10		NPN	RD RESISTOR 4.7 K-OHM 1/6W	8		
R11		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R12		NPN	RD RESISTOR 100 OHM 1/6W	1		
R13-15		NPN	RD RESISTOR 4.7 K-OHM 1/6W	3		
R16		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R17		NPN	RD RESISTOR 4.7 K-OHM 1/6W	1		
R18		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R19		NPN	RD RESISTOR 4.7 K-OHM 1/6W	1		
R20		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R21-22		NPN	RD RESISTOR 4.7 K-OHM 1/6W	2		
R23		NPN	RD RESISTOR 220 OHM 1/6W	1		
R24-25		NPN	RD RESISTOR 100 OHM 1/6W	2		
R26-29		NPN	RD RESISTOR 2.2 K-OHM 1/6W	4		
R30-33					NOT USED	
R34-37		NPN	RD RESISTOR 220 OHM 1/6W	4		
R38-41		NPN	JUMPER WIRE STP122	4	P=5mm	
R42					NOT MOUNTED	
R43-44		NPN	RD RESISTOR 4.7 K-OHM 1/6W	2		
R45		NPN	RN RESISTOR 5.1 K-OHM 1/6W	1		
R46-47		NPN	RD RESISTOR 10 K-OHM 1/6W	2		
R48		NPN	RN RESISTOR 2.2 K-OHM 1/6W	1		
R49-50		NPN	RD RESISTOR 10 K-OHM 1/6W	2		
R51-52		NPN	RN RESISTOR 1 OHM 2W	2		
R53		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R54		NPN	RD RESISTOR 33 K-OHM 1/6W	1		
R55		NPN	RD RESISTOR 2.2 K-OHM 1/6W	1		
R56		NPN	RD RESISTOR 10 K-OHM 1/6W	1		
R57-58		NPN	RD RESISTOR 2.2 K-OHM 1/6W	2		
R59-60		NPN	RN RESISTOR 1.5 K-OHM 1W	2		
R61-62		NPN	RD RESISTOR 220 OHM 1/6W	2		
R63-71		NPN	RD RESISTOR 2.2 K-OHM 1/6W	9		
R72-74		NPN	RD RESISTOR 220 OHM 1/6W	3		
R75-76		NPN	RD RESISTOR 10 K-OHM 1/6W	2		
R77		NPN	RN RESISTOR 1 K-OHM 1/6W 1%	1		
R78		NPN	RN RESISTOR 5.1 K-OHM 1/6W	1		
R79-81		NPN	RD RESISTOR 10 K-OHM 1/6W	3		
R82-85		NPN	RD RESISTOR 2.2 K-OHM 1/6W	4		
R86-88		NPN	RD RESISTOR 4.7 K-OHM 1/6W	3		
R89-91		NPN	RD RESISTOR 33 K-OHM 1/6W	3		
R92-94		NPN	RD RESISTOR 220 OHM 1/6W	3		
R95		NPN	RD RESISTOR 33 K-OHM 1/6W	1		
R96-98		NPN	RD RESISTOR 4.7 K-OHM 1/6W	3		
R99		NPN	RD RESISTOR 220 OHM 1/6W	1		
R100-101		NPN	RD RESISTOR 10 K-OHM 1/6W	2		
RA1		NPN	RESIS. ARRAY 4.7K-OHM 1/8W 8EL	1		
RA2		NPN	RESIS. ARRAY 2.2K-OHM 1/8W 8EL	1		
RA3		NPN	RESIS. ARRAY 4.7K-OHM 1/8W 4EL	1		

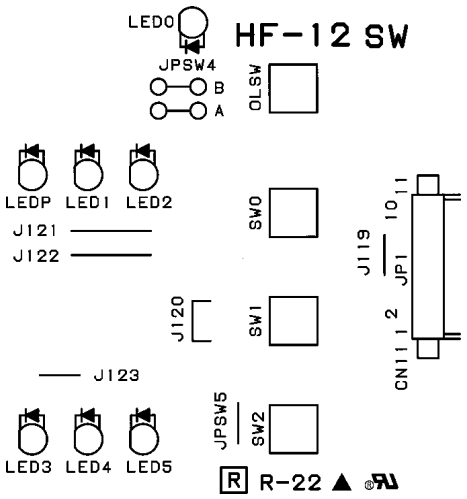
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
CN1		09100615	CONNECTOR 57RE4036080BD29A	1		
CN2		09100621	CONNECTOR 53253-1210	1		
CN3		09100573	CONNECTOR 53253-0610	1		
CN4		09100620	CONNECTOR 53253-0810	1		
CN5		09100267	CONNECTOR 5483-06A	1		
CN6		09100317	CONNECTOR 5483-04A	1		
CN8-9		09100624	CONNECTOR 51048-1300	2		
CN10		09100622	CONNECTOR 51016-1100	1		
CN11		09100623	CONNECTOR 51020-1100	1		
JP1		80705570	FLAT CABLE 11X215 HF-12H	1		
JP2		80705470	FLAT CABLE 13X298 HF-12	1		
JP3	*2	87775070	WIRE 20UL1007BLK180	1		
	#2	80701900	WIRE 20UL1007BLK180	1		
JP4-5	*2	87775080	WIRE 20UL1007BLK085	2		
	#2	80701910	WIRE 20UL1007BLK085	2		
JP6		80700250	WIRE 18UL1007BLK055T	1		
J63-JPSW1	#2	80701960	WIRE 28UL1007BLK075	1		
X1		09250040	CERA. OSCILLATOR CST12.0MTW	1		
L1	*2	09990706	BEADS INDUCTOR B-01AT	1		
	#2	09990737	BEADS INDUCTOR RH035047AT-Y7	1		
L2	*2	09990705	BEADS INDUCTOR B01-RT	1		
	#2	09990736	BEADS INDUCTOR RH035047RT-Y7	1		
L3	*2	09990706	BEADS INDUCTOR B-01AT	1		
	#2	09990737	BEADS INDUCTOR RH035047AT-Y7	1		
L4-5	*2	09990705	BEADS INDUCTOR B01-RT	2		
	#2	09990736	BEADS INDUCTOR RH035047RT-Y7	2		
L6	*2	09990706	BEADS INDUCTOR B-01AT	1		
	#2	09990737	BEADS INDUCTOR RH035047AT-Y7	1		
L7	*2	09990705	BEADS INDUCTOR B01-RT	1		
	#2	09990736	BEADS INDUCTOR RH035047RT-Y7	1		

5-2. Control Panel Board

5-2-1. Circuit Diagram



5-2-2. Component Layout



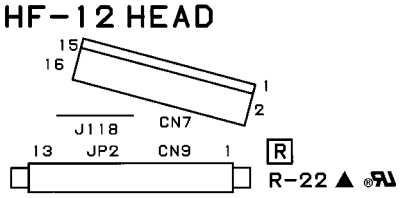
5-2-3. Parts List

Control Panel Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
SW0-2		09010041	PUSH SWITCH SKHHAL	3		
OLSW		09010041	PUSH SWITCH SKHHAL	1		
LED0-5,P	*2	08300151	LED LTL232	7		
	#2	08300168	LED GL3EG8	7		

5-3. Connected Board

5-3-1. Component Layout



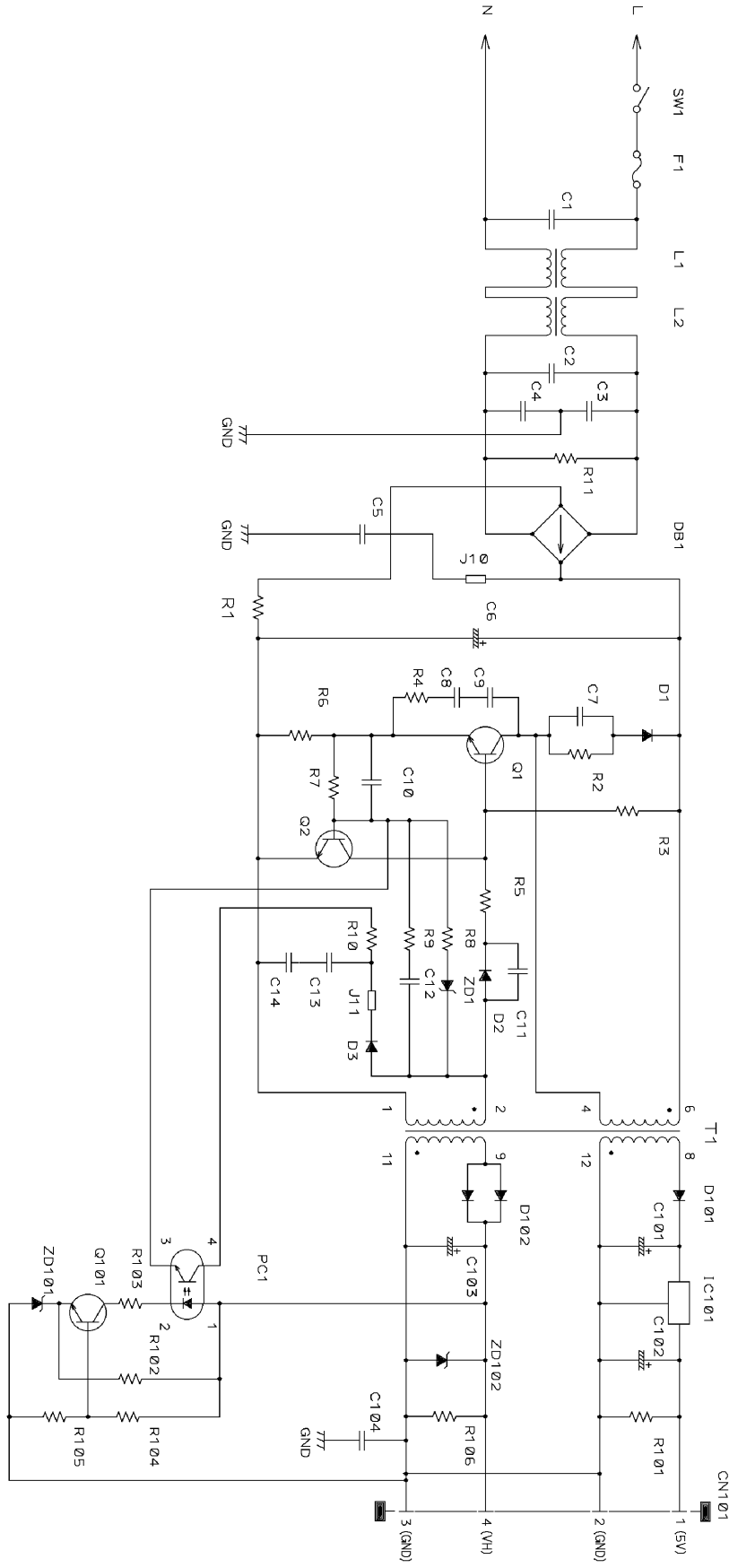
5-3-2. Parts List

Relay Board

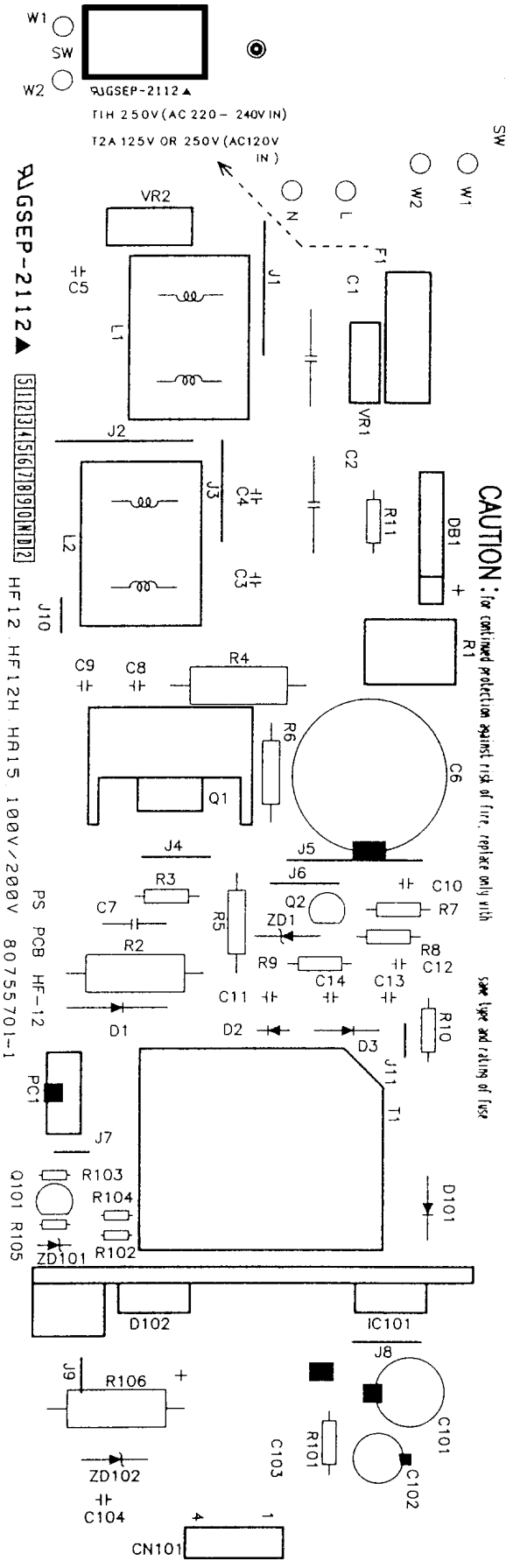
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
CN7		09100373	CONNECTOR HLEM16S-1	1		
J118		NPN	JUMPER WIRE STP122	1		

5-4. Power Supply Unit

5-4-1. Circuit Diagram



5-4-2. Component Layout



5-4-3. Parts List

Power Supply Unit

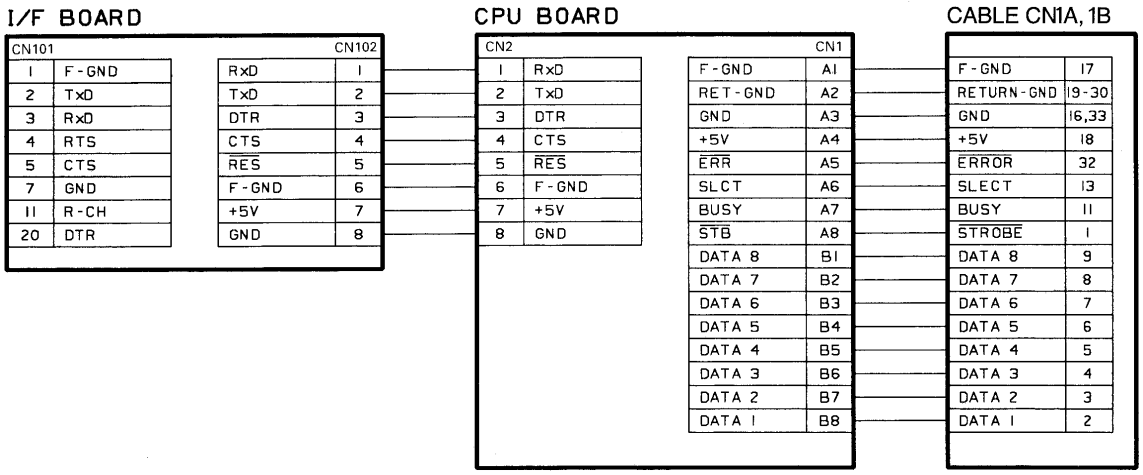
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
R1		NPN	CEMENT RESISTOR 5.6 OHM 5W	1	FOR US	
		NPN	CEMENT RESISTOR 10 OHM 5W	1	EXCEPT FOR US	
R2		NPN	RN RESISTOR 62 K-OHM 3W	1		
R3		NPN	RD RESISTOR 330 K-OHM 1/4W	1	FOR US	
		NPN	RD RESISTOR 680 K-OHM 1/4W	1	EXCEPT FOR US	
R4		NPN	RN RESISTOR 100 OHM 3W	1		
R5		NPN	RN RESISTOR 22 OHM 2W	1	FOR US	
		NPN	RN RESISTOR 39 OHM 2W	1	EXCEPT FOR US	
R6		NPN	RN RESISTOR 0.15 OHM 2W	1	FOR US	
		NPN	RN RESISTOR 0.36 OHM 2W	1	EXCEPT FOR US	
R7		NPN	RD RESISTOR 150 OHM 1/4W	1		
R8		NPN	RD RESISTOR 560 OHM 1/4W	1	FOR US	
		NPN	RD RESISTOR 820 OHM 1/4W	1	EXCEPT FOR US	
R9		NPN	RD RESISTOR 3.3 K-OHM 1/4W	1		
R10		NPN	RD RESISTOR 120 OHM 1/4W	1		
R11		NPN	RD RESISTOR 330 K-OHM 1/4W	1	FOR US	
		NPN	RD RESISTOR 680 K-OHM 1/4W	1	EXCEPT FOR US	
R101		NPN	RD RESISTOR 1 K-OHM 1/4W	1		
R102		NPN	RD RESISTOR 5.6 K-OHM 1/6W 2%	1		
R103		NPN	RD RESISTOR 1 K-OHM 1/6W	1		
R104		NPN	RN RESISTOR 5.6 K-OHM 1/6W 1%	1		
R105		NPN	RN RESISTOR 1470 OHM 1/6W	1		
R106		NPN	RN RESISTOR 1.5 K-OHM 3W	1		
ZD1		NPN	ZENER DIODE RD4.3EB3	1		
ZD101		NPN	ZENER DIODE RD6.2JSB2	1		
ZD102		NPN	ZENER DIODE RD39FB1-T	1		
C1		NPN	FILM CAPA. 0.22UF 250V	1		
C2		NPN	FILM CAPA. 0.1UF 275V	1	EXCEPT FOR US	
C3-5		NPN	CERA. CAPA. 2200PF 400V	3		
C6		NPN	CHEM. CAPA. 220UF 200V	1	FOR US	
		NPN	CHEM. CAPA. 100UF 400V	1	EXCEPT FOR US	
C7		NPN	FILM CAPA. 0.01UF 630V	1		
C8-9		NPN	CERA. CAPA. 470PF 1KV	2	FOR US	
		NPN	CERA. CAPA. 220PF 1KV	2	EXCEPT FOR US	
C10		NPN	FILM CAPA. 0.047UF 50V	1		
C11		NPN	FILM CAPA. 0.022UF 50V	1		
C12		NPN	FILM CAPA. 0.1UF 50V	1		
C13-14		NPN	FILM CAPA. 6800UF 50V	2	FOR US	
		NPN	FILM CAPA. 0.022UF 50V	2	EXCEPT FOR US	
C101		NPN	CHEM. CAPA. 1000UF 10V	1		
C102		NPN	CHEM. CAPA. 470UF 10V	1		
C103		NPN	CHEM. CAPA. 4700UF 35V	1		
C104		NPN	CERA. CAPA. 0.01UF 250V	1		
CN101	*2	NPN	CABLE UNIT 04X135CC (D)	1		
	#2	NPN	CABLE UNIT 04X135CC	1		
D1		NPN	FAST DIODE RU1P	1		
D2		NPN	FAST DIODE ERA22-02	1		
D3	*2	NPN	DIODE 1S1588	1		
	#2	NPN	DIODE 1S2076A*A	1		
D101		NPN	SCHOTTKY DIODE SB140	1		
D102		NPN	FAST DIODE FMX-12S	1		
DB1		NPN	DIODE STACK D2SBA60	1		
F1		09990080	FUSE 5TT2A-250V	1	FOR US	
		09990090	FUSE 215-1A-250V	1	EXCEPT FOR US	
		NPN	FUSE HOLDER PFC5000	2		
IC101		NPN	IC-REG KIA7805PI	1		

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
J10	*2	NPN	BEADS INDUCTOR B01-RT	1	FOR US	
	#2	NPN	BEADS INDUCTOR RH035047RT-Y7	1	FOR US	
J11	*2	NPN	BEADS INDUCTOR B01-RT	1		
	#2	NPN	BEADS INDUCTOR RH035047RT-Y7	1		
L1		NPN	NOISE FILTER HR-24-183	1	FOR US	
L1-2	*2	NPN	NOISE FILTER LF-4D-183	2	EXCEPT FOR US	
	#2	NPN	NOISE FILTER 64A-6001	2	EXCEPT FOR US	
PC1		NPN	OPTCOUPLER PC123FY2	1		
Q1		NPN	TRANSISTOR 2SC4546	1	FOR US	
		NPN	TRANSISTOR 2SC4234	1	EXCEPT FOR US	
Q101		NPN	TRANSISTOR 2SC1740SE	1		
Q2		NPN	TRANSISTOR 2SC2655	1		
SW1		NPN	SEESAW SWITCH T881SGSS9	1		
T1	*2	NPN	CONVERTER TRANSFORMER QBS-SDUS	1	FOR US	
	#2	NPN	CONVERTER TRANSFORMER HAD US	1	FOR US	
	*2	NPN	CONVERTER TRANSFORMER QBS-SDEC	1	EXCEPT FOR US	
	#2	NPN	CONVERTER TRANSFORMER HAD EC	1	EXCEPT FOR US	
W1-2	*2	NPN	CABLE UNIT 01X160T (D)	2		
	#2	NPN	CABLE UNIT 01X160T	2		
-	*2	NPN	SCREW TAT 3-8 CT-FL	3		
		NPN	WARNING SEAL ZBL-10	1		
	#2	NPN	CAUTION SEAL UK POWER CORD	1	FOR UK	
	*2	NPN	POWER CHASSIS HA-15	1		
		NPN	RADIATION PLATE QBS-10	1		
		NPN	FASTENER T18S	2	FOR AS,HK	
		NPN	FASTENER T18S	3	EXCEPT FOR AS,HK	
	*2	NPN	CORD SET EC-PN HA-10	1	FOR EC,LA	
	#2	NPN	CORD SET EC-PN HA-10	1	FOR EC,LA,RU	
		NPN	CORD SET US-PN HA-10	1	FOR US	
		NPN	CORD SET UK-PN LC	1	FOR UK	
	*2	NPN	CORD SET AS-PN LC	1	FOR AS	
	#2	NPN	CORD SET AS-PN L=1.8M LC	1	FOR AS	
	*2	NPN	CORD SET HK-PN QBA	1	FOR HK	
	#2	NPN	CORD SET HK-PN SAA-1.8M	1	FOR HK	
		NPN	SCREW TR 3-9 WS/WF	4		
		NPN	HEAT RADIATION BD PUH23-35	1		

* The fuse (F1) is the only part in the power supply unit that can be replaced.

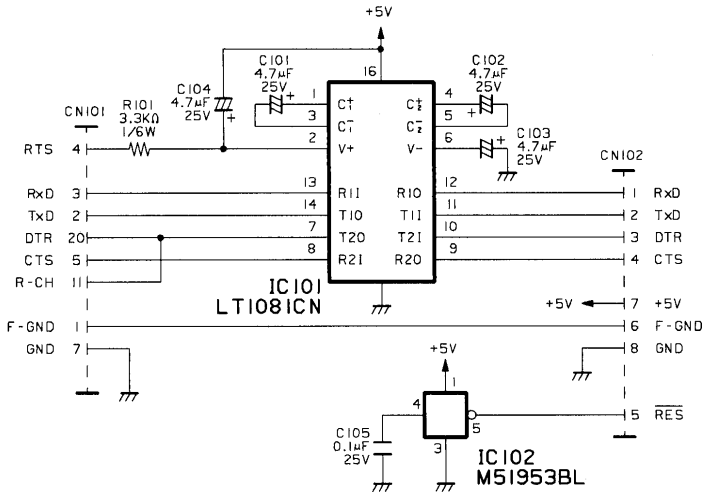
6. Serial - Parallel Converter Board (Option)

6-1. Wiring Scheme

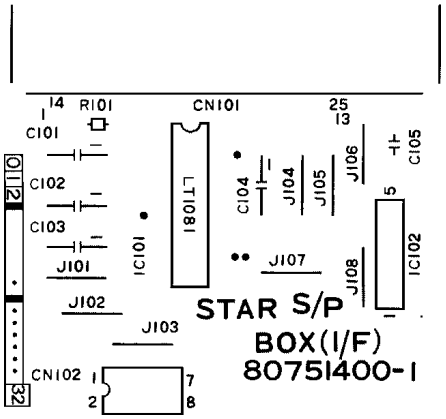


6-2. I/F Board

6-2-1. Circuit diagram



6-2-2. Component Layout

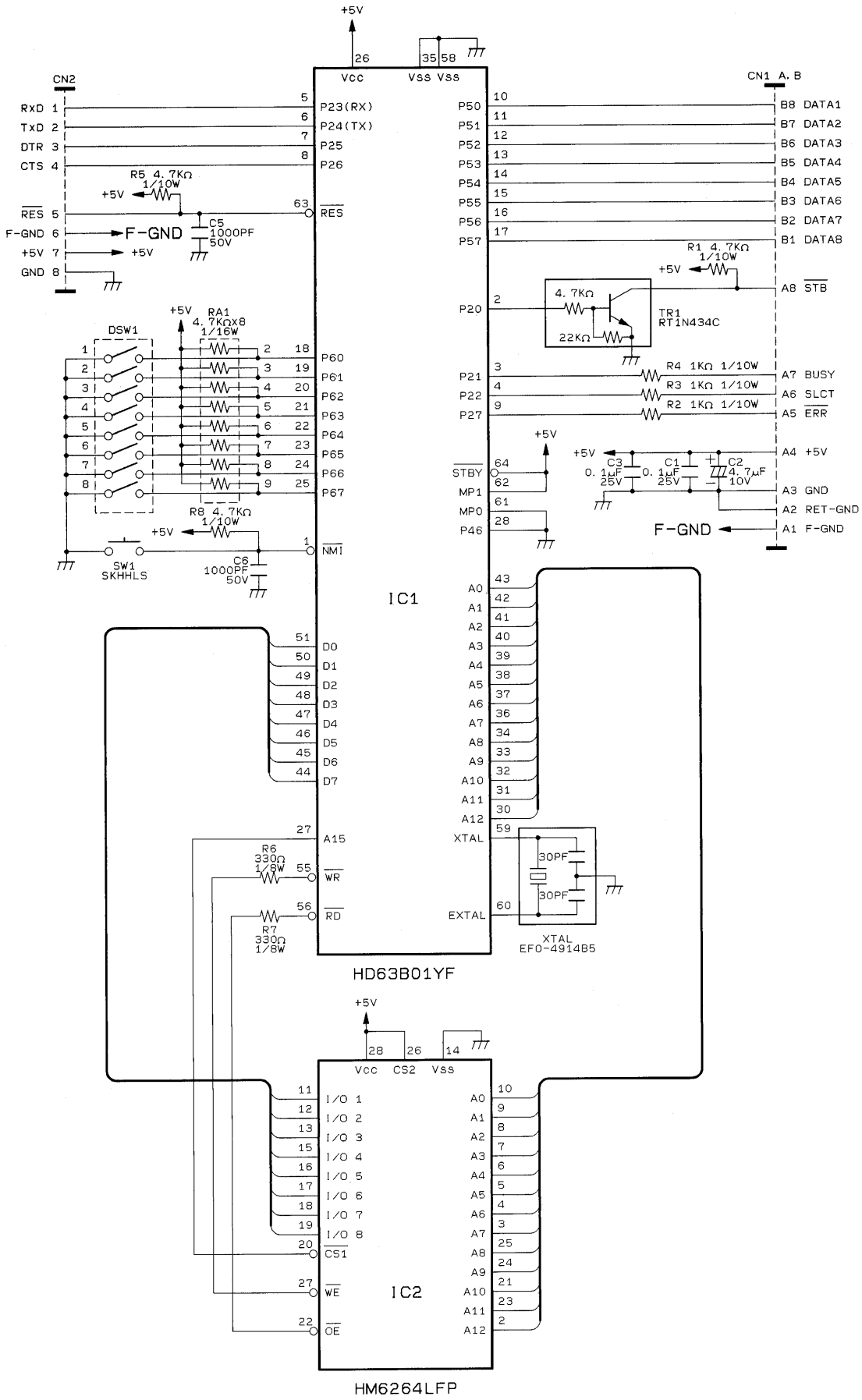


6-2-3. Parts List

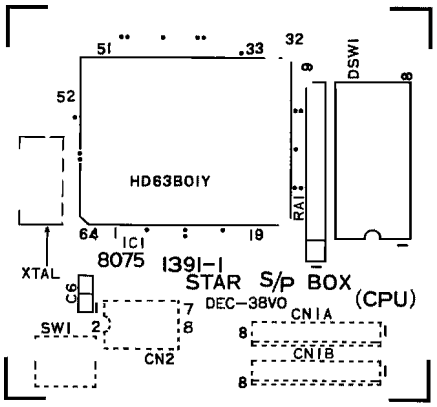
DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC101		08200125	IC-I/F LT1081CN	1		
IC102		08200109	IC-RESET M51953BL	1		
R101		NPN	RD RESISTOR 3.3 K-OHM 1/6W	1		
C101-104		NPN	CHEM. CAPA. 4.7UF 25V	4		
C105		NPN	CAPACITOR 0.1UF 50V	1		
CN101		09100461	CONNECTOR DBLC-J25SAF-23L8	1		
CN102		09100462	CONNECTOR 5532-08A	1		
J101-108		93930006	JUMPER WIRE STP122	8	P=10mm	

6-3. CPU Board

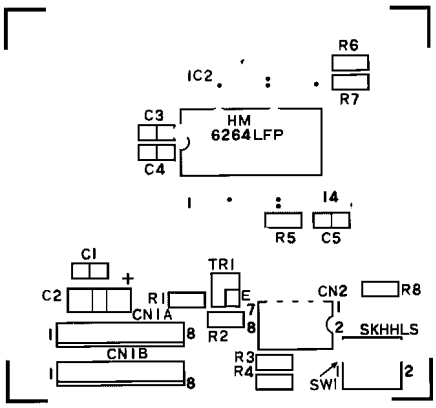
6-3-1. Circuit diagram



6-3-2. Component Layout



[Parts side]



[Solder side]

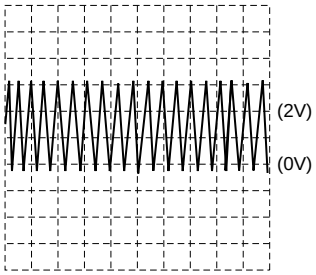
6-3-3. Parts List

CPU Board

DRWG.NO.	REV.	PARTS NO.	PARTS NAME	Q'TY	REMARKS	RANK
IC1		08250011	MASKED CPU HD63B01YF-IF	1		
IC2		08221021	SRAM HM6264LFP-100NS	1		
TR1		07603007	DIGITAL TRANSISTOR RTIN434C-T	1		
R1		NPN	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
TR2-4		06751021	CHIP RESISTOR 1 K-OHM 1/10W	3		
TR5		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
TR6-7		06783313	CHIP RESISTOR 330 OHM 1/8W	2		
TR8		06754721	CHIP RESISTOR 4.7 K-OHM 1/10W	1		
RA1		NPN	RESIS. ARRAY 4.7K-OHM 1/16W8EL	1		
C1		NPN	CERA. CAPA. CHIP 0.1UF 25V	1		
C2		NPN	TANTALUM CAPA. CHIP 4.7UF 10V	1		
C3		NPN	CERA. CAPA. CHIP 0.1UF 25V	1		
C4					NOT USED	
C5-6		NPN	CERA. CAPA. CHIP 1000PF 50V	2		
XTAL1		09250039	CERA. OSCILLATOR EFO-W4914B5	1		
DSW1		09090018	DIP SWITCH KSD08	1		
SW1		09010047	PUSH SWITCH SKHHLS0001	1		
CN1A-1B		80706070	INTERFACE CABLE SPC-8K	1		
CN2		09100463	CONNECTOR 5533-08CPB	1		

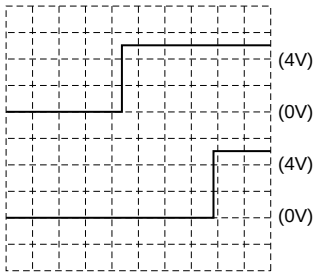
7. Waveform with Oscilloscope

(1) Crystal (12 MHz)



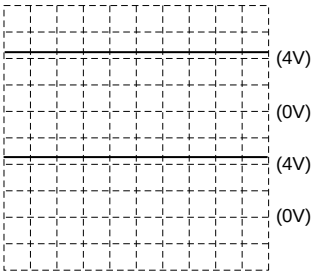
Crystal Pin 34 of IC1
Time/Div : 0.2 µs
Volt/Div : 1V

(2) $\overline{\text{RESET}}$ (Power on reset)



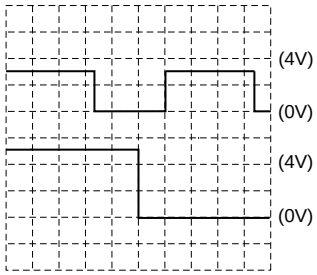
Upper : RESET input Pin 1 of IC8
Lower : RESET output Pin 3 of IC8
Time/Div : 10 ms
Volt/Div : 2V

(3) Protection Circuit



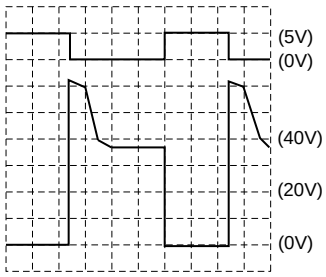
Upper : $\overline{\text{RESET}}$ Pin 3 of IC8
Lower : Drive Collector of TR13
Time/Div : 5 ms
Volt/Div : Upper 2V
Lower 2V

(4) Head Energizing Control Signal



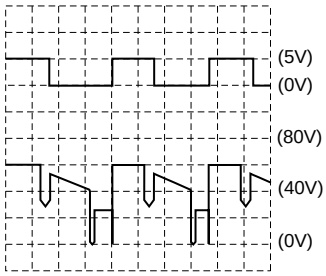
Upper : HDEN Pin 57 of IC6
Lower : HD1 Data Pin 47 of IC6
Time/Div : 50µs
Volt/Div : Upper 2V
Lower 2V

(5) Print Head Control Signal and Waveform



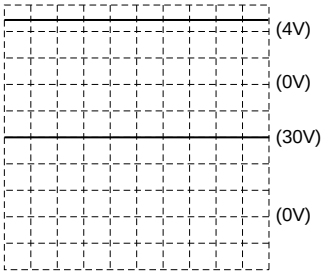
Upper : HD1 Data Pin 47 of IC6
Lower : HD1 Pin 5 of JP2
Time/Div : 0.1 ms
Volt/Div : Upper 5V
Lower 10V

(6) Carriage Motor Control Signal and Driving Signal



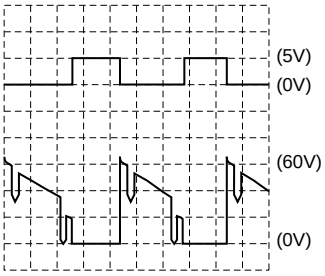
Upper : Carriage-ø1 Control Signal Pin 38 of IC6
Lower : Carriage-ø1 Driving Signal Pin 3 of CN5
Time/Div : 1 ms
Volt/Div : Upper 5V
Lower 20V

(7) Paper Feed Motor Common Control Signal and Driving Signal



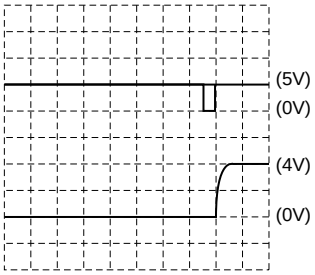
Upper : LF-CM Control SignalPin 39 of IC6
Lower : LF-CM Driving SignalPin 1 of CN3
Time/Div : 20 ms
Volt/Div : Upper 2V
Lower 10V

(8) Paper Feed Motor Control Signal and Driving Signal



Upper : LF-ø1 Control Signal Pin 13 of IC1
Lower : LF-ø1 Driving Signal Pin 3 of CN3
Time/Div : 2 ms
Volt/Div : Upper 5V
Lower 20V

(9) Parallel Interface (parallel type Only)



Upper : $\overline{\text{STB}}$ Pin 1 of CN1
Lower : BUSY Pin 11 of CN1
Time/Div : 50 ms
Volt/Div : Upper 5V
Lower 2V

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